

**STEP-BY-STEP**  
**2nd Ed.**

**A GUIDE TO**  
**MOBILITY TECHNIQUES**

**STUDY GUIDE**

**STREET CROSSING TECHNIQUES**  
**By Sandra Rosen, Ph.D.**

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# INTRODUCTION

Crossing the street is a complex task. It involves the use of several techniques specific to crossing streets, such as locating the proper position on the corner from which to cross and negotiating around vehicles that have pulled into the crosswalk. In addition, it involves the integrated use of numerous mobility techniques from several of the other Step-By-Step modules.

This module focuses primarily on the mobility techniques that are involved in street crossings. Many of these techniques are used in conjunction with one another; for the sake of simplicity, they are grouped into the following categories.

## Approach

These techniques focus on detecting arrival at an intersection and on assuming the traveler is in the appropriate position at the curb to initiate a crossing. They address variations in terrain (e.g., curbs, ramps, mid-block contacts) and negotiating obstacles in the travel path that lie immediately below the curb.

## Alignment

These techniques focus on body alignment at the curb to ensure a straight, direct path across the street. They address variations in intersection shapes (e.g., four-leg-right-angled, skewed) and traffic patterns (e.g., on the perpendicular or the parallel street, moving in a straight direction or turning).

## Executing Crossing

These techniques are used to negotiate intersections of varying size and configurations (e.g., presence or absence of median strips). Some techniques address specific travel situations, such as recovering from an unintended veer during a street crossing or making contact during a crossing with a car that has pulled into the crosswalk.

## Timing

These techniques are used to determine the safest time to initiate a street crossing at intersections that vary in size and in type of traffic control (e.g., unsignalized or signalized), and configurations (e.g., presence or absence of median strips).

In addition to mobility techniques, street crossings involve skills in many other areas of independent travel, including orientation, traffic pattern analysis, environmental awareness, and intersection analysis. For this reason, this module covers additional information on traffic patterns, traffic controls, and intersection analysis.

In-depth presentations of traffic-actuated signals, accessible pedestrian signals, and roundabout intersections are not included in Step-By-Step because they deserve a much more detailed presentation than can be provided in this manual. The reader may refer to other publications for specific information on these topics.

## **Special Situations**

These techniques are used when negotiating environmental situations occurring during a crossing that interfere with the traveler's ability to either complete the crossing within the WALK interval or to complete it with her original line of travel. These situations include such things as encountering a raised median strip or encountering vehicles that have pulled into the crosswalk and blocked the travel path.

# APPROACH

# INTERSECTION APPROACH

## Purpose

To approach a corner and locate the proper position for crossing

## Prerequisite Techniques

Alignment (with Parallel Traffic)<sup>1</sup>

Direction-Taking<sup>2</sup>

Negotiating Stairs<sup>3</sup>

Touch

Touch & Slide<sup>4</sup>

## Teaching Environments

Generally, the teaching environments progress from simple to complex (e.g., from quiet residential to small business, from quiet to congested, from familiar to unfamiliar).

Ideally, instruction begins in a quiet residential area in which the sidewalks have parkways<sup>5</sup> and distinct shorelines. The curbs should be deep enough (e.g., 6 inches or more) to be perceived easily with the cane. There should be no obstacles on or at the corner around which the traveler must negotiate. Square corners are often easier for new travelers to detect than rounded corners, because square corners appear to be located generally in front of the traveler, even if the traveler approaches them on a slight angle (see the footsteps labeled [a] and [b] in Figure 1.01). Rounded corners, on the other hand, may appear to be located somewhat on the side of the traveler if she contacts the curb at an angle. In this latter situation, contact with a rounded curb can more easily be confused with contacting a curb mid-block (see the footsteps labeled [c] and [d] in Figure 1.01). If all curbs in the area are rounded, then it is generally helpful to begin instruction at corners where the curbs are only minimally rounded.

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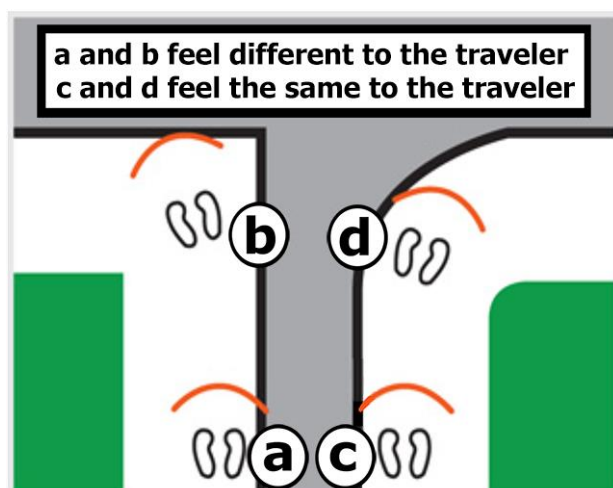
<sup>1</sup> Aligning with parallel traffic can be used to help verify if one has contacted the curb at the corner or mid-block.

<sup>2</sup> The DIRECTION-TAKING technique is used to establish parallel alignment to a curb when verifying if one has contacted the curb at the corner or mid-block.

<sup>3</sup> Knowing the NEGOTIATING STAIRS technique may help the traveler learn how to anchor the cane and walk up to a down-curb or the bottom of a curb ramp that she has contacted at the intersection.

<sup>4</sup> The TOUCH & SLIDE technique can be useful in detecting shallow curbs, curb ramps, and blended curbs for travelers who choose not to use the TOUCH (Constant Contact) technique.

<sup>5</sup> Depending on where one lives, parkways might also be called "tree lawns," "grassy areas," "curb strips," or "curb lawns," among numerous other names.



**Figure 1.01**

This diagram shows footprints (labeled a, b, c, and d) in relation to a square corner (left) and a rounded corner (right). A text box reads, "a and b feel different to the traveler. C and d feel the same to the traveler." See the text for a detailed description about these labels.

Progress first to areas that have more shallow curbs, then to areas with blended curbs (see Glossary) and sections of the curb that slope downward—known as "curb ramps"—with and without detectable warning surfaces. Gradually introduce corners that are more and more significantly rounded. Include travel experience in areas that have additional features, such as gratings or sewer covers and/or water present in the gutter below the curb and cars parked across crosswalks, to emphasize the importance of clearing and to provide practice in negotiating obstacles at the corner. As the traveler gains confidence, progress to areas in which there are increased amounts of vehicular and pedestrian traffic.

Lead up to travel in unfamiliar and gradually more complex environments, such as busy residential, small business, and urban areas.

## Skills

### Identify Arrival at the Intersection

There are many tactile, auditory, proprioceptive, and other cues that can be used to anticipate arrival at an intersection and to help verify that the curb detected is actually at an intersection and is not located mid-block.

#### Tactile

The traveler can use the TOUCH & SLIDE technique or the TOUCH (Constant Contact) technique to detect textural differences between the sidewalk and the street at corners where there are blended curbs or curb ramps.



- Some cities have installed detectable warning surfaces, such as truncated domes, to indicate the presence of a blended curb (see Figures 1.02a and 1.02b). Detectable warnings are now required at all new construction and renovation sites (see the U.S. Access Board web site at <http://www.access-board.gov>).



**Figure 1.02a**

Detectable warning surfaces can indicate the presence of a blended curb, shown here in relation to a crosswalk.



**Figure 1.02b**

Close-up of a detectable warning surface

### **Time and Distance Judgment**

The time and distance traveled from the beginning of the block or other known landmark often helps the traveler distinguish between contact with a curb that is located mid-block and with one at the intersection.

## **Proprioceptive Information—Gradients at the Corner**

The down-curb at an intersection is most readily detected by the downward movement of the cane tip and the consequent change in the traveler's wrist position as the tip drops off the edge. Landmarks (e.g., poles, bus shelters, benches) that are typically found near intersections may also be present. The location of these landmarks, however, is inconsistent. For example, poles are also found mid-block in some areas.

- If the cane tip drops off ahead of the traveler, this generally indicates that the curb is ahead of the traveler at the end of the block. If the cane drops off to the side of the traveler, it generally indicates that the traveler is mid-block.

In some hilly areas, the sidewalk will generally level off at the intersection immediately prior to a down-curb.

In some areas, the last several feet of the sidewalk before the corner will slope slightly down, indicating the presence of a curb ramp. At the destination corner, the curb ramp will slope slightly upward to meet the main sidewalk.

Blended curbs, where the sidewalk and the street are at the same level, can be difficult (and often impossible) to identify proprioceptively.

## **Temperature Changes**

On sunny days, a break in the building line may allow the traveler to feel the sun as she walks out of the shadow of a building. This change in heat may indicate to the traveler that she is nearing the intersection.

## **Presence of Wind**

A break in the building line may allow the traveler to feel the wind that had been blocked by the building. This change may indicate that the traveler is nearing the intersection.

## **Auditory Information** **Vehicular traffic**

Parallel traffic may slow, stop, or turn at the intersection.

Perpendicular traffic will sound increasingly closer as the traveler approaches the intersection.

If there is a building on the corner, there may be a sudden increase in the volume of sounds from perpendicular traffic, which becomes audible as the traveler passes the end of the building. The traveler may also be better able to detect sounds from farther away on the perpendicular street since these sounds are no longer blocked by the building.

## Pedestrian traffic

**Note:** Pedestrian traffic is not as structured and controlled as vehicular traffic; therefore, it is not a dependable source of information.

If there is a building on the corner, there may be a sudden increase in the volume and proximity of sounds from pedestrian traffic on the perpendicular sidewalk that become audible as the traveler passes the end of the building.

The traveler may encounter pedestrians standing at the corner as they wait to cross the street.

## Miscellaneous environmental sounds

There are a variety of environmental sounds that can serve as secondary landmarks for corners or for determining one's proximity to a corner down-curb. For example, storm drains are often located at corners, but they also may be found mid-block. Furthermore, storm drains provide sound clues only when water is flowing into them, and they may not provide any sound clues at all when clogged with leaves and debris.

## Reflected sounds

Reflected sounds from such things as the cane tip contacting the sidewalk, the traveler's own footsteps, or (sometimes) traffic, will cease when a building line ends. This is often perceived auditorily as a break in the building line or an open space and may indicate that the traveler is approaching the corner.

## Intersection Approach

Use this technique to approach an intersection and position oneself to cross the street safely and efficiently. This skill is an integral part of all street crossings.

1. Using the TOUCH (Standard or Constant Contact) technique or the TOUCH & SLIDE technique, the traveler approaches the corner.
2. When the cane tip drops off the edge of the curb, the traveler maintains her current alignment, pauses, and anchors the cane tip in midline either at the edge or against the vertical face of the curb.
  - Anchoring her cane either at the edge or against the vertical face of the curb keeps the tip out of the way of traffic on the street and assists the traveler in monitoring her position relative to the curb (see Figure 1.03).
  - If the traveler fails to identify the down-curb or street edge of a ramp and oversteps the curb or curb ramp by only one step, she should try to maintain her alignment and simply step backward onto the curb or curb ramp and position herself for the crossing. If the traveler loses her alignment, she must re-establish it using the ALIGNMENT technique.
  - Using her cane and available auditory information, the traveler verifies that she has arrived at a corner—and that her cane has not simply contacted the parallel

curb at a mid-block position (see section "Curb Contact: Determining Corner vs. Mid-Block").

- Listening to the sounds of nearby traffic, the traveler also verifies that she is a proper distance from the parallel street to cross safely. She does not want to be so close that a slight veer while crossing will place her dangerously close to passing cars on the parallel street. Similarly, she wants to ensure that she is not so far from the parallel street that she would likely be walking outside of the crosswalk area and potentially encounter idling or parked vehicles on the perpendicular street. The need to verify one's distance from the parallel street is most significant when traveling in areas with very wide sidewalks.



**Figure 1.03**

Anchoring her cane at or on the edge of the curb keeps the tip out of the way of traffic on the street and assists the traveler in monitoring her position relative to the curb.

3. Maintaining her direction, the traveler walks up to a point 2–5 inches from the curb.
  - This position helps ensure that the traveler's first step will clear the edge of the curb.
  - If the traveler hears a vehicle approaching too closely, she may need to move back a step or so until it passes. This is especially important if a large vehicle, such as a truck or bus, is turning right at the start corner. The traveler may also want to stand slightly farther back from the curb on a rainy day (unless she is wearing appropriate rain gear) so that she won't get splashed by a vehicle going through a puddle.
  - The traveler should not place her toes over the edge of the curb. Doing so may interfere with her alignment at rounded corners and it may also place her too close to traffic that is turning the corner close to the curb.
4. The traveler clears the street, where she will take her first step by sweeping her cane tip on the ground in either an arc, a bisected arc, or an "X" pattern (see

Figures 1.04a–1.04c). In this way, she can locate any obstacles (e.g., deep puddles, debris, parked cars) or safety concerns (e.g., open storm drain).

- Some instructors prefer to teach the traveler to clear upon arrival at the down curb and then check alignment; in this way, the traveler will not spend time aligning, only to find that there is an obstacle in the immediate path and that she must now locate a new position on the corner from which to cross and then realign. Other instructors prefer to teach the traveler to clear the street after she has confirmed her alignment so that she has to clear only once (checking exactly where she will step into the street).
- If an obstruction is present in the traveler's path, she should locate a new position on the corner from which to cross (see section entitled "Obstacle at the Corner").
- If the traveler did not determine the height of the curb when clearing, she should check it by lowering her cane tip to the street at the curb edge and raising it back up over the curb edge. Knowing the curb height can help her adjust the height and distance of her first step off the curb to maintain her balance and direction of travel.
  - Knowing the curb height also can be especially helpful to travelers who have impaired balance. If a traveler judges the curb to be too steep to step down safely, she may choose to seek out a curb ramp or select a route with lower curbs, if possible.



**Figure 1.04a**

The traveler clears the street where she will step by sweeping her cane tip on the ground in an arc (indicated here by an arcing white arrow).





**Figure 1.04b**

The traveler clears the street where she will step by sweeping her cane tip on the ground in a bisected arc (indicated here by an arcing white arrow bisected by a straight line).



**Figure 1.04c**

The traveler clears the street where she will step by sweeping her cane tip on the ground in an X shape (indicated here by two crisscrossing arrows).

5. The traveler stands erect with her head, trunk, and feet facing forward; she evenly distributes her weight on the balls of her feet while waiting to cross (see ALIGNMENT technique). The traveler holds her cane in a semi-vertical position and anchored at the curb; the cane tip may be placed either on the curb or immediately below it and within the traveler's body width so as not to be in the way of other pedestrians (see Figures 1.05a and 1.05b).



**Figure 1.05a**

The traveler holds the cane with the tip above the curb.



**Figure 1.05b**

The traveler holds the cane with the tip below the curb.

### **Other Ways to Hold the Cane**

The traveler holds the cane vertically in front of her body (see Figure 1.06). This position may be especially helpful in keeping the cane out of the way of other pedestrians on crowded corners, but the cane may not be as visible to drivers as it is when held in the semi-vertical position.



**Figure 1.06**

The traveler holds the cane vertically in front of her body.

The traveler holds the cane vertically with the cane tip in front of her toes, either on the sidewalk or immediately below the curb. She extends her arm to push the grip of the cane forward away from her body (see Figure 1.07). This position is less comfortable for the traveler, yet it may make the cane more visible to drivers.



**Figure 1.07**

The traveler holds the cane vertically with the cane tip in front of her toes and her arm extended to push the grip of the cane forward away from her body.

The traveler may choose to hold the cane vertically next to the side of her body closest to the parallel street (rather than at midline). She may feel that this makes the cane more visible to drivers on the parallel street who are approaching from behind the traveler and who may turn onto the perpendicular street directly in front of her. This position, however, may make the cane less visible to traffic on the perpendicular street.



## Notes for Teachers

### Curb Contact: Determining Corner vs. Mid-Block

Use this technique to identify whether one has contacted a curb mid-block or at an intersection.

1. The traveler stops walking when her cane tip falls off the edge of the curb at her side.
2. While listening for traffic, she slides her cane tip along the curb edge to determine the curb's direction (see Figure 1.08).
  - The shape of the curb and its position and direction relative to traffic help the traveler to determine whether she is mid-block or at a rounded corner. If the curb is primarily located on the traveler's side and does not curve, her position is most likely at mid-block rather than at a corner.
    - If the curb runs parallel to the traveler's direction after she aligns to parallel traffic, then she is most likely at a mid-block location.
    - If traffic on the perpendicular and parallel streets does not appear to be in the expected forward and side positions, or if traffic on the perpendicular street sounds too far away, then the traveler's position is most likely at mid-block rather than at a corner.
    - If the perpendicular street is a busy street and the parallel street is a quiet street, and if the midblock curb is mistakenly determined to be the destination corner at the perpendicular street, then the perpendicular street will be quiet.
    - In a familiar area, the traveler can use time-distance judgment to determine if she has likely walked far enough to reach the corner.



**Figure 1.08**

While listening for traffic, the traveler slides her cane tip along the curb edge (indicated here by a white arrow) to determine the curb's direction.

3. If mid-block, the traveler adjusts her alignment parallel to the curb and/or traffic and then continues travel.

## **Negotiating an Obstacle at the Corner**

Use this technique to locate a clear space from which to begin crossing the street when an obstacle or hazard lies immediately below the curb in the original travel path.

1. Upon locating an obstacle when clearing, the traveler moves 1–2 steps (or more, if needed) to the side, using a modified THREE-POINT technique (performed from above the curb), to locate a clear place to cross, and then she clears again. She repeats this procedure until she finds a clear and safe place to cross.
  - Some travelers feel that moving away from the parallel street prevents them from being too close to parallel traffic and also avoids them having to cross at a point where the curb is more rounded; other travelers feel that moving toward the parallel street makes them more visible to traffic and minimizes the potential of encountering a car parked at the curb.

## **Curb Ramps & Blended Curbs**

This technique is used to effectively locate the street edge of a curb ramp or blended curb and position oneself for a safe and efficient crossing.

1. If the traveler detects a curb ramp or anticipates contacting a curb ramp or blended curb, she can use the TOUCH & SLIDE or TOUCH (Constant Contact) technique as she approaches the corner to identify textural and/or slope differences or the joint between the sidewalk and the street.
2. When her cane tip detects the street edge of the curb ramp or blended curb, the traveler anchors the tip on the edge at midline. She then walks up to her cane and stands about 2–5 inches away from the edge.
  - If necessary, the traveler can often confirm the presence of a perpendicular street by checking with her cane for a perpendicular curb next to the curb ramp (on the side away from the parallel street). This reach with the cane should be done slowly and carefully so as to avoid tripping other pedestrians accidentally.
  - It is important that the traveler maintain her original direction of travel when walking to the street edge of a curb ramp. Because curb ramps often face diagonally into the intersection, turning to follow the slope of the curb ramp toward the street can cause the traveler to be aligned incorrectly to cross the street.
3. The traveler verifies her alignment using traffic sounds or maintains her original travel alignment (if traffic sounds are not available). She does not align with the edge of the ramp or blended curb.
4. The traveler clears the area of the street immediately beyond the edge of the ramp or blended curb where she will take her first step. She holds the cane in the semi-vertical position while she determines when to begin crossing.

- The traveler may choose to stand slightly back from the street edge of a blended curb while waiting to cross because some vehicles tend to come up over blended curbs when making right-hand turns.
  - Some instructors prefer to teach the traveler to clear upon arrival at the down curb and then check alignment; in this way, the traveler will not spend time aligning, only to find that there is an obstacle in the immediate path and that she must now locate a new position on the corner from which to cross and then realign. Other instructors prefer to teach the traveler to clear the street after she has confirmed her alignment so that she has to clear only once (checking exactly where she will step into the street).
5. Holding her cane in the semi-vertical position (or other position described earlier, in the section "Intersection Approach"), the traveler stands slightly back from the street edge of the curb ramp or blended curb while waiting to cross. She does this because some vehicles tend to come up over blended curbs when making right-hand turns.

### **Blended Curbs**

At some blended curbs, it may be possible to detect a slight decline to the gutter (for water drainage) either with the cane or under foot; in other areas, however, it is not possible to identify such declines. Therefore, in many urban areas, detectable (tactile) warnings, such as truncated domes, are being installed to indicate the presence of a blended curb. Detectable warnings, however, are not present everywhere.

As a further note, detectable warnings are not necessarily installed so that their edge is aligned with the direction of travel to the crosswalk. For this reason, tactile warnings cannot be used to assist with alignment at blended curbs (LaGrow & Long, 2011).

### **Making Multiple Crossings at an Intersection**

Use this technique to locate the proper position at the curb to cross the street when approaching the curb immediately after crossing the intersecting street.

1. After crossing the first street, the traveler takes three steps forward and then turns toward the parallel street (see Figure 1.09). In most cases this will position her in or near the crosswalk or proper area from which to begin crossing the second street.
  - If, after turning toward the parallel street, the traveler fails to locate the perpendicular sidewalk leading to the street, she should use the SIDEWALK RECOVERY procedures to locate the perpendicular sidewalk and then approach the curb facing the (formerly parallel, now perpendicular) street.



**Figure 1.09**

After crossing the first street, the traveler takes three steps forward and then turns toward the parallel street. In most cases this positions her in or near the crosswalk or proper area, from which she can begin crossing the second street. This photo shows multiple images of the traveler, with arrows that indicate her direction of travel.

2. Using the method for Approach, the traveler walks up to the corner and then clears.

## **Crossing Perpendicular to the Line of Travel**

This technique is used to locate the proper position at the curb to cross the street when approaching the intersection from the parallel sidewalk.

1. Upon contacting the curb of the perpendicular street, the traveler turns around and takes three steps back in the direction from which she came. In most cases, this will position her on or near the perpendicular sidewalk.
2. The traveler then turns toward the parallel street and, using the method for Approach, walks up to the corner (see Figures 1.10a and 1.10b).
  - If the traveler turns toward the parallel street but fails to locate the perpendicular sidewalk (e.g., locates a parkway), she can use the SIDEWALK RECOVERY procedures to locate the sidewalk and then approach the curb facing the (formerly parallel, now perpendicular) street.
  - When the traveler reaches the curb of the perpendicular street, she can verify that she is at the correct crossing location on the curb by using traffic sounds or the presence of parkways to judge her distance from the corner.



**Figure 1.10a**

Upon contacting the curb of the perpendicular street, the traveler turns around and takes three steps back in the direction from which she came. This photo shows two images of the traveler facing in opposite directions, with an arrow that circles around the images to indicate her direction of travel.



**Figure 1.10b**

She then turns toward the parallel street and, using the method for Approach, walks up to the corner. This photo shows two images of the traveler, with an arrow that indicates her direction of travel.

## Common Errors and Corrections

### Error:

The traveler fails to clear before stepping off the curb.

### Correction:

Clearing before stepping off the curb enables the traveler to detect any obstacles that may be located immediately below the curb.

**Error:**

When holding her cane in the diagonal position at the corner, the traveler positions her cane with the tip extending more than a few inches beyond her body width.

**Correction:**

Holding her cane in the diagonal position without allowing the tip to extend more than a few inches beyond her body width keeps the cane tip out of the travel path of other pedestrians.

**Error:**

The traveler follows the slope of the curb ramp to the corner.

**Correction:**

The traveler should not depend on the slope of the ramp to indicate the correct alignment for crossing. While some ramps are aligned perpendicularly to the street, others may be angled toward the intersection.

**Error:**

Rather than bringing her cane to midline before walking up to it at the corner, the traveler anchors her cane at whatever point it contacts the curb and turns her body as needed to walk up to it.

**Correction:**

Bringing her cane to midline before walking up to the curb enables the traveler to maintain her original forward line of travel.

**Error:**

The traveler places both toes over the edge of the curb while waiting to cross.

**Correction:**

The traveler should stand 2–5 inches back from the curb while waiting to cross. Placing her toes over the edge can decrease her stability should she be bumped inadvertently by another person. It can also position her too close to traffic in the near lane. Lastly, it can confuse some drivers because it may appear as if the traveler is about to step off the curb at any moment.

**Error:**

The traveler stands more than 1–2 feet back from the curb.

**Correction:**

The traveler should stand 2–5 inches back from the curb while waiting to cross. Standing back too far from the curb can confuse drivers by giving them the impression that the traveler is not planning to cross the intersection.

**Error:**

Upon detecting that her crossing may be unsafe, the traveler fails to return to the curb after overstepping it by only one step.

**Correction:**

Returning to the curb after overstepping it by only one step moves the traveler out of the street until she verifies that it is safe to cross.

**Error:**

While waiting to cross, the traveler stands below the curb ramp (in the street gutter, where it is flat) rather than on the slope of a curb ramp.

**Correction:**

The traveler should remain on the curb ramp while waiting to cross. Standing in the street can place her too close to traffic moving in the first lane.

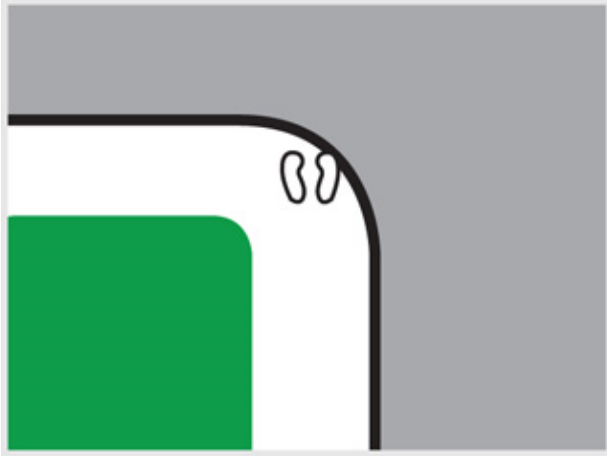
## Notes for Teachers

To teach the concept of square corners versus rounded corners, try the following procedures:

- **Square Corners**
  - Have the traveler stand so that the curb edge divides each foot at the same place (e.g., the curb edge must lie underneath the balls of both feet; it may help the traveler to roll her weight momentarily over the balls of her feet to verify this). Both feet must be parallel to each other. The traveler's body should also be aligned forward.
- **Rounded Corners**
  - Have the traveler stand at the curb edge and note that when she is aligned forward, the curb will lay just under the ball of one foot, but ahead of the other (see Figure 1.11).

**Note:** To emphasize the importance of clearing at either type of corner, it may be helpful to include travel experiences in which there are gratings, sewer covers, leaves, litter, and/or water present in the gutter below the curb or where cars are parked across the crosswalk.





**Figure 1.11**

If the corner is rounded, the traveler may find that when standing with feet side-by-side, the curb edge is directly in front of one foot while underneath her other foot, or that the toes of one foot are close to the curb edge while the toes of the other foot are farther away.

## Related Techniques

Alignment<sup>1</sup>

Basic Crossing

Negotiating an Obstacle at the Corner

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<sup>1</sup> While the basic INTERSECTION APPROACH skill is not a direct prerequisite to alignment, it is generally taught as the first component in street crossings.



# ALIGNMENT

# STREET-CROSSING ALIGNMENT

## Purpose

Use this technique to align oneself to cross the street safely and efficiently. This technique encompasses a few methods of alignment specific for use at intersections of varying shapes and/or traffic conditions.

## Prerequisite Techniques

Approach

## Teaching Environments

This technique is often taught in conjunction with the BASIC CROSSING and TIMING techniques.

Generally, the teaching environments progress from simple to complex (e.g., from quiet residential to small business), from quiet to congested, and from familiar to unfamiliar.

The ALIGNMENT technique is generally introduced at:

- Four-leg-right-angle (plus-shaped) intersections, where the sidewalk has distinct shorelines and is aligned with the sidewalk across the street
  - This helps the new traveler to verify when she has crossed the street without veering.
- Streets that are narrow to medium width
  - Narrow-to medium-width streets (25–35 feet; 2–4 lanes, including parking lanes) minimize the potential for a significant veer that can cause disorientation for the new traveler.
- Intersections that have light to moderate perpendicular and parallel traffic with distinct breaks in traffic
  - Light to moderate traffic provides ample opportunities for new travelers to practice alignment skills without the added stress of crossing streets with heavy traffic. Similarly, there should be no masking sounds (e.g., construction) in the area that may make it more difficult to hear and align with traffic.

Progress to areas that have the following characteristics:

- Intersections have increased and varying amounts of pedestrian and vehicular traffic.
- Streets are progressively wider. Wider streets increase the potential for an inadvertent veer and emphasize the need to continually monitor the direction of traffic flow and one's own line of travel throughout the entire crossing.

- Intersections have irregular shapes (e.g., skewed, offset) to provide further practice and refinement of alignment skills.

Gradually progress to travel in unfamiliar and more complex environments, such as residential, small business, and urban areas.

## Skills

The skills below describe the primary ways in which travelers align in order to cross the street safely and efficiently. These methods of preparing to cross are an integral part of all street crossings.

### Body Alignment

1. The traveler stands a few inches back from the curb edge.
  - Her head and trunk are erect and facing forward.
  - Her feet are slightly apart and pointing forward.
  - Some travelers find that keeping their weight evenly distributed on the balls of their feet and leaning slightly forward at the curb helps them to project a straight line of travel forward when they step off the curb.
  - Once aligned, it is important that the traveler not shuffle her feet or rotate her head or trunk. Doing so could alter her projected line of travel.

### Alignment in the Absence of Traffic Sounds

If the traveler's direction of travel is dependably straight and she can maintain this direction through the approach and waiting phases of the street crossing, she may assume that she is aligned correctly to cross a conventional intersection that is either four-leg-right-angled or T-shaped.

If the traveler's direction of travel is altered as she approaches the corner or while she waits at the curb, she can use the following methods to regain her direction of travel in the absence of traffic sounds.

#### Re-approach the Corner

1. The traveler turns around and proceeds back a short distance along her approach route. The traveler then reverses direction and re-approaches the corner, establishing a straight line of travel.

#### Alignment at Square Corners

1. If the traveler can verify that she has arrived at a square corner or at the top of a T-shaped intersection, she can position her feet so that they are equidistant from the curb in front of her.
  - By sliding her cane laterally to each side along the curb edge, the traveler can often determine whether an intersection has square or rounded corners. If the curb is square, her cane will remain in a position generally in front of her body. If

the curb is rounded, the cane tip will appear to move either behind her or closer to her shoulder line on one side and more in front of her body on the other side. This assumes, however, that she has approached the corner with a relatively straight line of travel.

### **Use of Landmarks**

1. In familiar areas, the traveler can use a known landmark at the corner to assist in establishing a direction of travel. Such landmarks might include nearby grass lines (other than those next to a curb ramp) or the curb edge located adjacent to a curb ramp on the side furthest from the parallel street (the curb at this point is generally aligned with the perpendicular street).
  - While grass lines can sometimes be used to assist with alignment, those on the side of a curb ramp are rarely aligned with the crosswalk. Such grass lines, therefore, cannot be relied upon for assistance with alignment.
  - Using landmarks for alignment is generally done when it is not possible to align using other methods or if the traveler wishes to verify her alignment after she establishes it by other means.

### **Shorelining**

This method works only in environments that have a consistent, inside shoreline to which the traveler can align. Also, because of the cumbersome nature of this method, it is generally used only as a last resort when other alignment methods fail.

1. Using the TOUCH & DRAG technique, the traveler follows the inside edge of the sidewalk (farthest from the parallel street) as she approaches the curb.

### **Alignment and Curb Ramps**

In some areas, there may be separate crosswalks for the parallel and perpendicular street. While curb ramps are required by code to be within the crosswalk, their slope must align to the gutter so as not to pose a tipping hazard to wheelchair users (Scott et. al, 2011). The slope, therefore, may not be aligned with the crosswalk, especially in areas where there is a large radius curve at the corner. At other intersections, one large curb ramp is angled toward the apex of the intersection and serves people crossing either the perpendicular or parallel streets. When detecting a curb ramp, therefore, it is important for the traveler to maintain her original line of direction and not follow the slope of the ramp to locate the corner or follow the direction of the slope to determine her proper alignment for crossing.

## **Alignment with Traffic**

### **General Information**

Perpendicular traffic crosses the traveler's path (see Glossary, Figure 13).

Parallel traffic passes alongside the traveler, moving either in the same direction as the traveler or in the opposite direction (also called “oncoming traffic”; see Glossary, Figure 13).

“Near-lane” traffic (either near-parallel or near-perpendicular) occupies the lanes closest to the traveler. “Far-lane” traffic (either far-parallel or far-perpendicular) occupies the lanes farthest from the traveler; on a two-way street, the far-lane traffic will be on the other side of the middle line, or past the middle of the street (see Glossary, Figure 13).

- Near-lane traffic is usually easier to perceive and utilize for alignment than far-lane traffic.

### **Alignment with Parallel Traffic**

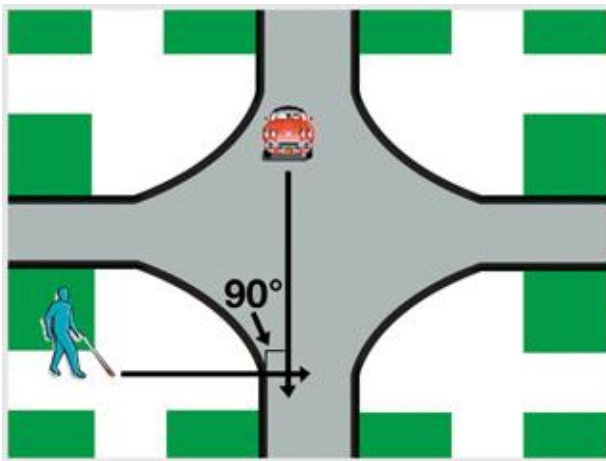
Use this skill to align with traffic on the parallel street in order to cross the perpendicular street safely and efficiently. This skill incorporates all aspects of the “Standard Approach” skill.

1. The traveler aligns her body and projects a forward line of travel that is parallel to the nearest straight-traveling parallel traffic. She does not align with turning vehicles.
  - Here is a trick that is sometimes useful: If the vehicle is in the curb lane and is going in the same direction as the traveler, she can listen for the point when she last hears the vehicle and face that point. As a note of caution, however, this is more difficult to do with a vehicle that is a lane farther from the curb. Also, in noisy environments, the traveler may have difficulty hearing this point sufficiently far ahead of her to provide a good line of travel.
  - Another trick that is sometimes useful is to establish a clock face reference for alignment. For example, near-lane vehicles on the parallel street that are going in the same direction as the traveler will approach at 7:00, will be loudest at 9:00, and will depart at 11:00; oncoming traffic in the near lane will approach at 1:00, be loudest at 3:00, and will depart at 5:00.
  - Another option is to establish body reference points when aligned (e.g., same-direction parallel vehicles will approach from just behind the left ear, will be loudest next to the traveler, and will depart from the left temple; oncoming traffic will approach from the right temple, be loudest next to the traveler, and depart just behind the right ear).
  - Due to the shape of the outer ear and the nature of sound waves, “same-direction traffic” (parallel traffic going in the same direction as they are) can often be heard for a longer period of time as it proceeds past the intersection ahead of the traveler than oncoming traffic can be heard as it goes behind the traveler.
2. During the street crossing, the traveler continues to monitor the direction of traffic in order to maintain a direction of travel parallel to it.

## Alignment with Perpendicular Traffic

This skill is used to align with traffic on the perpendicular street in order to cross safely and efficiently. It incorporates all aspects of the "Standard Approach" skill.

1. The traveler aligns her body perpendicularly to the nearest straight-traveling perpendicular traffic; she does not align with turning vehicles. The traveler projects a straight line of travel forward from that position.
  - Perpendicular traffic should cross the traveler's projected straight line, forming at a 90-degree angle (see Figure 2.01).
  - When a vehicle is loudest, it is generally directly in front of the traveler.
  - Establishing a clock face or body reference can sometimes help the traveler align with perpendicular traffic.



**Figure 2.01**

Perpendicular traffic should cross the traveler's projected straight line at a 90-degree angle. Arrows on this diagram indicate the perpendicular and straight lines of travel; a label indicates the 90-degree angle between these lines.

### Notes:

A vehicle that has not stopped or slowed at the intersection will often provide the best sound cues for alignment.

The traveler should never align with turning vehicles, because doing so may cause the traveler to veer. Turning vehicles can often be identified auditorily by the sound of their motor slowing down as they approach the turn.

It is often easier to determine the exact direction of the traffic auditorily in the following circumstances:

- There are no masking sounds.
- The day is not rainy or windy, because weather conditions can distort sounds. On the other hand, rain alone may actually make sounds louder and easier to hear.

- Vehicles do not stop at the intersection.
- Vehicles are in the nearest lane.

Perpendicular traffic does not provide reliable directional information for crossing at intersections that are other than four-leg-right-angled or T-shaped (when perpendicular traffic is at the top of the T). In addition, some travelers simply find it easier to align using parallel traffic than using perpendicular traffic. For these reasons, travelers generally use parallel traffic for their primary alignment and then use perpendicular traffic for confirmation. If parallel traffic is not available, travelers can align with perpendicular traffic and correct for any veer after they cross the street and reach the opposite curb.

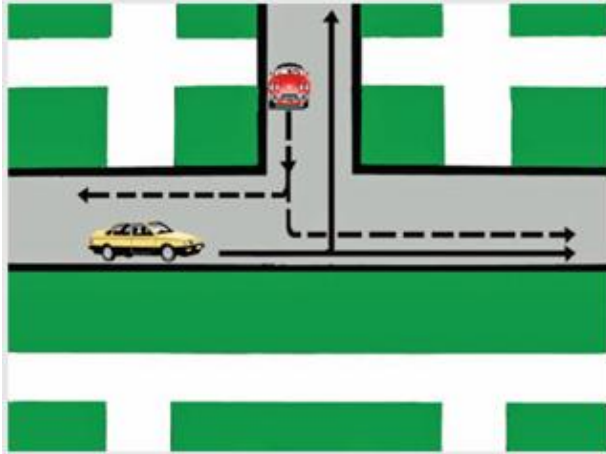
Travelers who are able to establish a consistent, straight line of travel in the block preceding the intersection can sometimes project that line to travel directly across that street and use traffic sounds as a secondary, rather than as a primary, means of verifying alignment (Hill & Ponder, 1976).

## **General Modifications**

There are some general modifications regarding alignment at intersections other than four-leg-right-angle intersections.

### **T-Shaped Intersections**

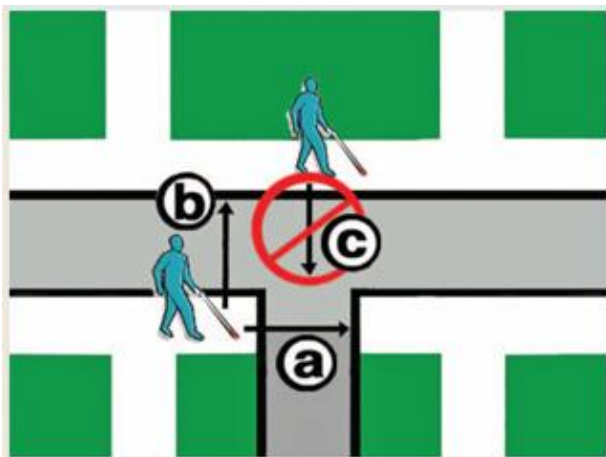
A T-shaped intersection can sometimes be identified by a consistent traffic pattern, in which all traffic on one street turns while traffic on the other street either turns or proceeds straight ahead (see Figure 2.02). However, this method is not always reliable. Even at four-leg-right-angled intersections, traffic on one of the streets may generally turn onto the other (e.g., such as when the first street is actually a road leading from a parking lot onto a main street).



**Figure 2.02**

A T-shaped intersection sometimes can be identified by a consistent traffic pattern, in which all traffic on one street (identified by the stem of the T in this diagram) turns either left or right, while traffic on the other street (identified by the top of the T) proceeds straight ahead or turns (left in this diagram).

It is generally easiest to cross either (a) the stem of the T or (b) from the stem of the T toward the top of the T. Initiating a crossing from the top of the T should be done only if traffic controls, traffic volume, and the environment allow this. In addition, unless the traveler is able to use a known landmark or auditory information to establish the proper location at the top of the T from which to begin a crossing, there is the risk of inadvertently crossing into the stem of the T rather than to the curb (c). See Figure 2.03, Labels a–c.



**Figure 2.03**

It is generally easiest to (a) cross the stem of the T. It also is possible to (b) cross over the top of the T in a direction going from the stem to the top of the T if traffic controls, traffic volume, and the environment allow this. Unless the traveler is able to use a known landmark or auditory information to establish the proper location at the top of the T from which to begin a crossing, there is the risk of (c) inadvertently crossing into the stem of the T rather than to the curb (c).

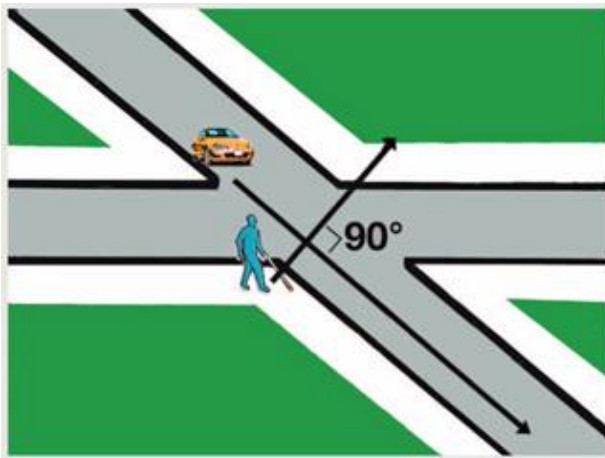


the stem of the T rather than to the curb. Labels and arrows indicate the direction of travel, and travel path (c) is crossed out.

## Skewed intersections

A skewed intersection can often be identified by the inability to be simultaneously aligned with both parallel and perpendicular traffic.

The traveler aligns her body parallel to straight-traveling parallel traffic; she does not align with turning vehicles or perpendicular traffic. Aligning with perpendicular traffic at a skewed intersection can cause the traveler to veer (see Figure 2.04).



**Figure 2.04**

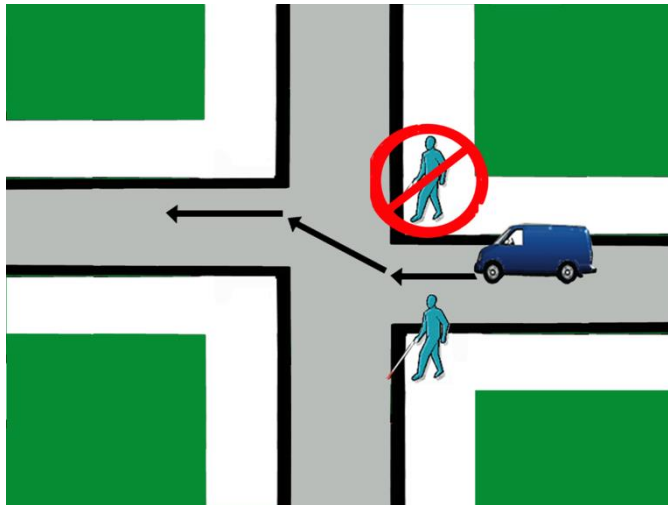
Aligning with perpendicular traffic at a skewed intersection can cause the traveler to veer. Arrows indicate the skewed and the straight directions of travel; the 90-degree angle between these lines of travel is labeled.

## Offset and Irregular Intersections

Offset and irregular intersections often can be identified by the sound of parallel traffic that approaches a corner and then turns slightly as it continues through the intersection. At an offset intersection (see Figures 2.05a and 2.05b), auditory traffic information can sometimes mimic that present at a T-shaped intersection.

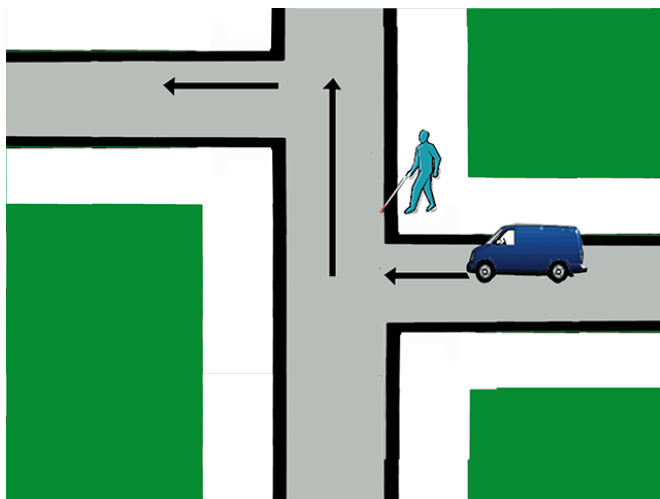
The traveler crosses an offset intersection using the procedures for crossing a T-shaped intersection; or, if it is possible to get an accurate line of travel using parallel traffic, she can cross it at a skewed intersection. As shown in Figure 2.05a, depending upon the configuration of the intersection, it may not be safe to initiate the crossing from a corner that is aligned with the continuation of the street (shown by the location of the top pedestrian in Figure 2.05a).

The traveler crosses an irregular intersection by aligning with parallel traffic as it moves beyond the start corner and goes through the intersection.



**Figure 2.05a**

An offset intersection often can be identified by the sound of parallel traffic that approaches a corner and then turns slightly as it continues through the intersection, as the arrows in this diagram show. A crossed-out pedestrian indicates that it may not be safe to initiate the crossing from a corner that is aligned with the continuation of the street.



**Figure 2.05b**

If the continuation of the parallel street is sufficiently offset, auditory traffic information can sometimes mimic that present at a T-shaped intersection. Arrows indicate the turns and directions of travel the car is taking.

## Common Errors and Corrections

### Error:

The traveler shuffles her feet while waiting at the corner to cross the street.

### Correction:

Unless she is purposely altering her alignment (e.g., in response to traffic sounds), keeping her feet pointing forward without shuffling them at the corner helps the traveler to maintain her line of travel.

### Error:

The traveler aligns with perpendicular traffic at a skewed intersection.

### Correction:

The traveler should align only with parallel traffic at a skewed intersection. This helps to ensure a straight line of travel across skewed intersections. Aligning with a perpendicular vehicle can cause the traveler to veer during the crossing.

### Error:

The traveler aligns with a vehicle that is turning at the intersection.

### Correction:

The traveler should never align with a turning vehicle. Aligning with a turning vehicle can cause her to veer as she crosses the street. The traveler should align only with a vehicle that is driving straight through the intersection.

### Error:

The traveler ignores available parallel traffic and aligns to the curb in an unfamiliar area.

### Correction:

Aligning with a passing parallel vehicle, when available, helps to ensure that the traveler is aligned properly to travel straight across the street. Aligning with the curb edge can be unreliable, especially in areas where the curbs are rounded.

### Error:

The traveler fails to maintain her feet pointing forward while waiting to cross at a corner.

### Correction:

Standing with both feet pointing forward helps the traveler to maintain her line of travel and minimizes the potential for veering when she steps off the curb.

## Error:

The traveler fails to maintain her head facing forward while waiting at the corner to cross the street.

## Correction:

Facing her head and trunk forward, as well as her feet, helps to ensure that the traveler is aligned properly to travel straight across the street. Turning her head may pull her body slightly out of alignment when she steps off the curb, which may lead to veering.

**Note:** If the traveler has a significant scoliosis, her trunk may be physically rotated slightly toward one side. This rotation can potentially affect her ability to maintain a straight line of travel, causing her to consistently veer toward one side (often in the direction of the highest curve of her spine). If this is the case, the traveler may need to adjust her initial alignment or position of her cane arm to compensate for the effect of trunk rotation on her ability to maintain a straight line of travel.

## Notes for Teachers

When evaluating a traveler's body alignment, the instructor should do so from various angles and check for the following:

- Is the traveler standing a few inches back from the edge of the curb?
- Is the traveler aligned with her head, trunk, and feet facing forward?
- Is the traveler's weight distributed evenly on her feet?
- Is the traveler's cane in an appropriate waiting position, with the cane tip not extending more than 1–2 inches outside of her body width?
- Does the traveler step off the curb in a forward direction, or does she alter her alignment as she steps off?

Initial street-crossing lessons are generally conducted with an "all-clear" (absence of traffic or other masking sounds at, approaching, or receding from the intersection), so that both the traveler and the instructor can concentrate on the fundamental mechanics of the crossing without concern for approaching or idling vehicles. As the traveler soon learns, however, street crossings are often easier to negotiate in the presence of traffic because of the auditory cues provided for alignment.

Many travelers find that it is generally easier to align with parallel traffic going in the same direction as they are (same-direction traffic), rather than with traffic going in the opposite direction (oncoming traffic). For this reason, it is often helpful to begin by learning to align with traffic in the near lane that is going in the same direction as the traveler. Then, in order of increasing difficulty, progress to aligning with traffic in the following ways:

- In the near lane of the parallel street that is going in the opposite direction of the traveler (near-lane oncoming traffic)

- In the far lane of the parallel street that is going in the same direction as the traveler (far-lane same-direction traffic)
- In the far lane of the parallel street that is going in the opposite direction of the traveler (far-lane oncoming traffic)
- In the near lane of the perpendicular street (near-lane perpendicular traffic)
- In the far lane of the perpendicular street (far-lane perpendicular traffic)

At a familiar intersection that has a shoreline immediately alongside the sidewalk, the traveler can use the TOUCH & DRAG technique to follow the shoreline up to the corner and establish a line of travel across the street. This technique is used only when other methods of alignment are not possible and only in familiar areas where the direction of the shoreline that is being followed is known to be parallel to the traveler's desired line of travel across the street.

## Related Techniques

Areas Without Sidewalks

Basic Crossing

Curb Contact: Determining Corner vs. Mid-Block

Gas Stations

Negotiating a Median Strip

Railroad Crossings

Recovery from a Veer

Vehicle in the Crosswalk

# **EXECUTING CROSSING**

# BASIC CROSSING

## Purpose

This technique is used to cross a street and arrive at the destination corner safely and efficiently. This method is an integral part of all street crossings.

## Prerequisite Techniques

Alignment  
Approach  
Negotiating Stairs<sup>1</sup>

## Teaching Environments

This technique is often taught in conjunction with UNSIGNALIZED INTERSECTIONS (No Traffic Present, also called “all-clear”).

Intersections at which there are definite periods with no traffic in the area are ideal for teaching these skills to travelers. If such an intersection is not available, then start at intersections where at least the perpendicular traffic is controlled by a stop sign and where there are long and definite breaks in traffic.

Initially practicing crossings at such an intersection allows the traveler to concentrate on the mechanics of crossing the street without having to deal with any stress or distraction that may be caused by nearby traffic. As the traveler will discover in time, street crossings are often easier to perform when there is nearby parallel traffic because of the additional cues available to assist with alignment.

- The instructor may also choose to guide the traveler from behind during the first few crossings to ensure a straight line of travel and, thereby, give the traveler an immediate feel of success.
- Select intersections with curb ramps or with curbs that are about 4–6 inches in height. Some travelers initially find it easier to maintain their line of travel after stepping off a curb of that size than after stepping off a deeper curb (more than 6 inches).
- Select four-leg-right-angled or T-shaped intersections where the sidewalk across the street is in line with the traveler’s established line of travel and where there are no obstacles (e.g., poles) on the sidewalk of the destination corner. This minimizes the need to align with traffic or to perform the RECOVERY FROM A VEER technique and also minimizes challenges posed by having to negotiate obstacles while completing a crossing.

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<sup>1</sup> Knowing the NEGOTIATING STAIRS technique may help the traveler learn how to anchor the cane and approach a down-curb that she has contacted at the intersection and also to anchor the cane and approach an up-curb that she contacts after crossing the street.

- Select intersections where the perpendicular street is only two driving lanes wide (with or without parking lanes). Such narrow streets minimize the crossing distance during which the traveler needs to maintain her line of travel without veering outside of the crosswalk zone. The traveler gradually learns to maintain her line of travel across progressively wider streets.
- Select intersections at which the perpendicular street has a definite crown and “camber” (the slight arch in the surface of the street designed to allow rain to run toward the drains in the gutter). An easily detected camber can assist the traveler to identify when she is approaching the destination curb and to more readily identify a veer into the parallel street.

As the traveler develops skill in performing the BASIC CROSSING technique in the above environments, additional instruction and experience is provided at intersections with the following features:

- Increased and varying amounts of traffic
- Variety of traffic patterns and controls
- Various curb heights (e.g., very shallow to deep, blended, and those with curb ramps)
- Progressively wider streets
- Streets with less definite crowns or cambers
- Obstacles (e.g., poles) on the destination corner, which emphasizes the importance of clearing with the cane before stepping up on the curb

Finally, the traveler is given the opportunity to further practice and refine this technique in conjunction with learning other street crossing techniques, including RECOVERY FROM A VEER, VEHICLE IN THE CROSSWALK, crossing at SIGNALIZED INTERSECTIONS, and NEGOTIATING MEDIAN STRIPS, as well as strategies for crossing at a variety of intersection shapes.

## Skills

### Standard

The traveler consciously maintains her body alignment facing forward and mentally projects a straight line to the destination corner.

1. The traveler extends the cane forward, keeping the tip down. She then pauses to verify that it is safe to cross.
  - If she wishes, the traveler can also use the EXTRA ARC technique to attempt to attract the attention of drivers (see “Signaling Drivers”).
2. When the traveler has determined that it is safe to cross, she steps off the curb in-step with her cane.
3. Walking at a normal speed or slightly faster, the traveler crosses the street using the TOUCH technique and contacts the destination curb with her cane.



- The increased speed often assists in maintaining a straight line of travel that should direct the traveler to the up-curb. The traveler, however, should never run or walk faster than is safe for the environmental conditions.
  - While crossing, the traveler should continuously monitor her direction and position utilizing available sensory information, such as the sounds of parallel vehicular traffic, idling perpendicular traffic, pedestrians, and sound sources on the destination corner. The traveler also monitors the movement or traffic around her as she crosses. She does this by performing left/right scanning, focusing attention in the direction from which traffic would be approaching (e.g., when crossing a two-way street, looking to her left during the first half of the crossing and to her right during the second half) or by using lane-by-lane scanning (looking specifically lane-by-lane where traffic would be approaching).
  - The traveler should maintain her own line of travel across the street and not purposely follow other pedestrians. A pedestrian may intentionally veer, for example, when crossing a street to go over to a parked car or to step up on the sidewalk at a point distant from the corner.
    - Some travelers in large, congested cities find that when a very large crowd of people is crossing the street, they can follow the flow of the pedestrian crowd to the destination corner. In doing so, however, the traveler must still maintain her own orientation to traffic and other information to ensure that she does not inadvertently follow the crowd to a position other than the destination curb.
  - In some environments, the traveler can use the crown of the street (the high point in the camber of the street) to monitor how far across the street she has traveled. She can also use the camber of the street as it lowers toward the destination corner (for drainage purposes) to indicate the location of the destination curb.
  - In a relatively familiar environment, the traveler can use time-distance judgment to estimate the distance that she has traveled across the street.
  - Some travelers find it helpful to lower their arc height or switch to the "Constant Contact" version of the TOUCH technique as they approach the destination corner to more easily detect a shallow curb, if one is present.
4. When her cane contacts the curb on the destination corner, the traveler anchors the cane against the vertical edge of the curb and walks up to it using the CONTACTING & EXPLORING OBJECTS technique.
    - The traveler should slow her pace at the last moment when she anticipates contacting the curb to allow herself sufficient reaction time when her cane actually does contact the curb.
  5. Lifting the cane over the curb edge, the traveler clears the sidewalk to detect any obstacles that may be present.
    - If the sidewalk is obstructed, the traveler can use the RECOVERY FROM A VEER technique in order to locate a clear space in which to step onto the sidewalk.

- Because most obstructions (e.g., poles) are located near the inside shoreline of a sidewalk, the traveler will most often find a clear path on the side of the obstacle that is closest to the parallel street.
6. The traveler steps up onto the curb and notes the relative position of the parallel street, if traffic is present, and perpendicular street to confirm her orientation at the corner.
  7. The traveler then continues travel when she is ready.

## Crossing Alleys

1. The traveler crosses an alley using the same procedures for crossing a street.
  - Alleys vary greatly in their physical features, can sometimes be difficult to identify, and can be mistaken for a street. Some alleys even have curb edges where the sidewalk meets them, similar to streets. Some possible indicators that the traveler has arrived at an alley include:
    - Distance traveled
      - Alleys are often located at the midpoint of the block.
    - Absence of large amounts of perpendicular traffic
    - Difference between texture of the surface below the curb and that of the sidewalk (e.g., cinders or gravel vs. asphalt)

In addition, alleys are generally narrower than streets, and in a business area, the building line is often directly adjacent to the edge of the alley rather than being set back by a sidewalk.

## Common Errors and Corrections

### Error:

The traveler fails to stop, clear, and listen for a safe street-crossing timing before stepping off the curb.

### Correction:

Stopping, clearing, and listening for a safe-street-crossing timing before stepping off the curb helps to ensure that the traveler will not inadvertently step out in front of an approaching vehicle.

### Error:

Upon hearing a vehicle approaching on the perpendicular street while she is crossing, the traveler turns around and returns to the curb.

### Correction:

Unless the vehicle is detected in the first few steps of the crossing, the traveler should not turn around, but rather should continue forward and adjust her pace accordingly—slowing, stopping, or speeding up, depending on her own judgment of the traffic

situation. Drivers expect pedestrians in crosswalks to continue walking forward. If the traveler turns around, this may surprise or confuse drivers and lead to an accident.

### **Error:**

The traveler fails to clear before stepping up onto the curb after crossing the street.

### **Correction:**

Clearing before stepping up onto the curb minimizes the possibility that the traveler will walk into an obstacle above the curb.

## **Notes for Teachers**

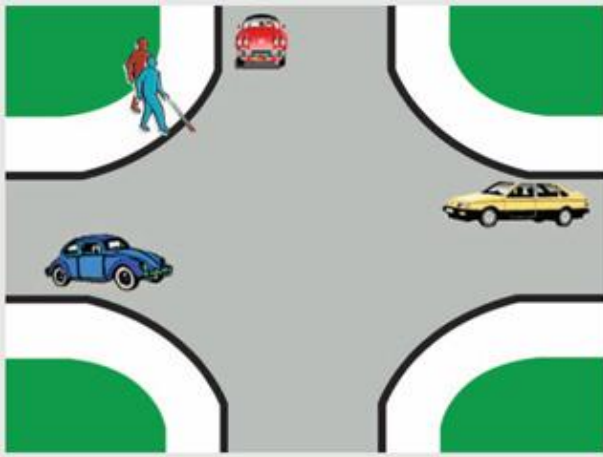
For travelers who lack confidence or who are fearful of crossing streets, it may be helpful to practice initial street crossings using the BASIC GUIDING technique or by guiding from behind. Doing so enables the traveler to become familiar with the width and camber of the street. It also allows the traveler to experience monitoring her line of travel as she crosses without simultaneously dealing with any stress, fear, or anxiety that she may feel about crossing the street. In this procedure, the traveler is responsible for performing all previously learned street crossing procedures, such as initial alignment and proper use of her cane during the street crossing. Support from guiding from behind or from the BASIC GUIDING technique, however, should be withdrawn as soon as possible.

It is important for the teacher to be consistent in monitoring the traffic, traveler's cane technique, and the traveler's selected street-crossing timing in order to maintain the traveler's trust as well as to ensure her safety at all times. If in doubt, the teacher should stop the traveler from crossing.

As the traveler aligns herself with traffic and prepares to cross, the instructor stands next to and slightly behind her on the side furthest from the parallel street (see Figure 3.01a). This position affords the instructor a simultaneous view of the traveler and the traffic flow at the intersection, while not placing the instructor in a position where her presence might interfere with the traveler's ability to monitor traffic or the drivers' ability to see the traveler and her cane.

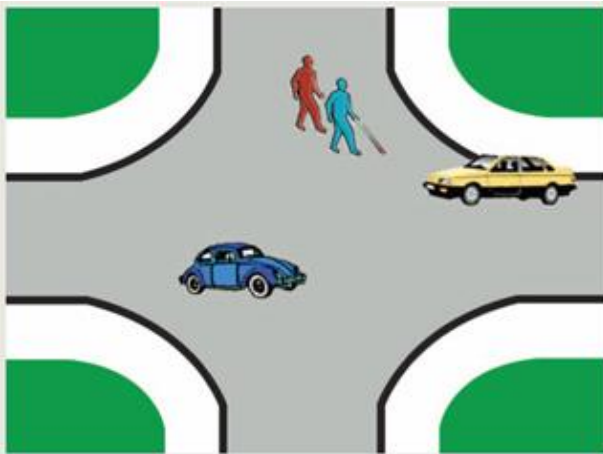
- As the traveler crosses the street, the instructor walks behind the traveler and slightly to one side to best see traffic and to be ready to correct the traveler's line of travel if she comes dangerously close to moving traffic. Depending on the location of the nearest moving or potentially moving traffic, this may mean that the instructor would begin walking on one side of the traveler and then move to her other side, as needed.
  - Some instructors prefer to walk behind the traveler and on the side farthest from any moving traffic (see Figure 3.01b). They feel that in this way they can simultaneously observe the traveler and the traffic without having to turn their heads.

- Some instructors prefer to walk behind the traveler and on the side nearest any moving traffic (see Figure 3.01c). They feel that in this way they can most easily observe the traffic (especially if the teacher is shorter than the traveler) and are best positioned to protect the traveler and to physically prompt, or nudge, the traveler away from traffic should she start to veer.
- It should be noted that some travelers may not like to be touched or may find that being touched during a street crossing is disconcerting. In all cases, it is best if the instructor can provide only verbal feedback and make physical contact with the traveler only when absolutely necessary for safety.



**Figure 3.01a**

To spot, the instructor (shown as a red pedestrian figure in this diagram) stands next to and slightly behind the traveler (shown as a blue pedestrian figure) on the side away from the parallel street.



**Figure 3.01b**

An instructor (shown as a red pedestrian figure) may prefer to walk behind the traveler (shown as a blue pedestrian figure) and on the side farthest from any moving traffic.



**Figure 3.01c**

An instructor (shown as a red pedestrian figure) may prefer to walk behind the traveler (shown as a blue pedestrian figure) and on the side nearest any moving traffic.

## Related Techniques

- Areas Without Sidewalks
- Recovery from a Veer
- Signalized Intersections
- Unsignalized Intersections
- Vehicle in the Crosswalk

# RECOVERY FROM A VEER

## Purpose

To identify the direction of a veer during a street crossing and to relocate the desired sidewalk in order to resume travel

## Prerequisite Techniques

Alignment  
Basic Crossing  
Three-Point  
Touch & Drag  
Upper Hand & Forearm (Modified)

## Teaching Environments

Introduce this technique in a quiet, residential area that has distinct curbs and little or no traffic. Give the traveler experience in recovering from veers both toward and away from the parallel street in areas where there are no parked vehicles in the way and where there is a parkway that:

- Can be easily traversed (e.g., grass)
- Cannot be traversed (e.g., bushes)
- Can be traversed, despite the possible presence of obstacles on the parkway (e.g., poles, guy wires, low-hanging tree branches)

After the traveler has mastered the basic mechanics of street crossing recovery, practice this technique in environments where the traveler will contact parked vehicles or other obstacles blocking the curb for which she is looking.

Practice this technique in areas with increased traffic, but where there's still a separate parking lane.

Finally, practice this technique in areas with traffic moving in the curb lane (where there is no separate parking lane).

Opportunities to practice this technique often present themselves naturally during the course of instruction in travel.

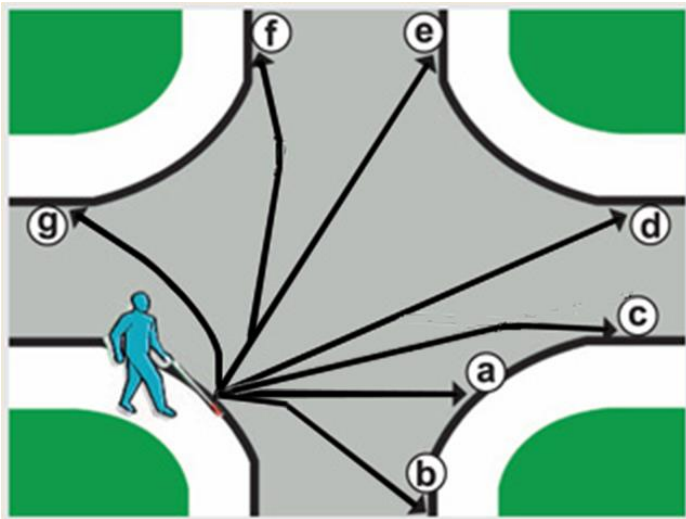
# Skills

## Introductory Concepts

### Types of Veers

When a traveler veers, there are generally seven possible locations on the opposite curb at which she might land (Jacobson, 2013). Possible travel paths are indicated by the labels in Figure 4.01. These seven labeled paths show crossing:

- (a) to the intended destination corner
- (b) the perpendicular street with a veer away from the parallel street and locating the destination curb too far from the parallel street
- (c) the perpendicular street with a slight veer into the parallel street and locating the near parallel curb
  - Another situation that can happen is veering slightly toward, and then continuing travel in, the parallel street (in the driving lane or parking lane) without locating the near parallel curb.
- (d) to the diagonally opposite corner and locating the far parallel curb
- (e) to the diagonally opposite corner and locating the far perpendicular curb
- (f) the parallel street and locating the near perpendicular curb
- (g) the parallel street and locating the far parallel curb



**Figure 4.01**

There are seven possible travel paths when crossing a perpendicular street (labeled a–g); all but path (a) are undesirable, as they each depict a form of veering. The paths of travel are described in detail above.

### Causes of Veering

Several factors can cause the traveler to veer unintentionally during a street crossing. Some common causes are:

- Improper alignment prior to crossing,

- An unusual slope in the perpendicular street,
- Poor performance of the TOUCH technique (e.g., unequal arc width, poorly centered hand, excessive arm motion),
- Posture and gait problems that make straight-line travel more difficult for some travelers (Rosen, 2010),
- Traveler anxiety due to an idling engine or moving lane of parallel traffic.

There are several methods for identifying a veer, as the table on the following pages shows.



## Identifying a Veer

Available Information	Toward the Parallel Street	Away From the Parallel Street
Time-Distance Information	<ul style="list-style-type: none"> <li>• The distance traveled during the crossing appears to be greater than the width of the perpendicular street.</li> <li>• The distance from the starting corner to the crown appears to be shorter than the distance from the crown to the traveler's present location.</li> </ul>	<p>Not typically helpful, but consider the following:</p> <ul style="list-style-type: none"> <li>• Unless the veer is severe, the distance traveled during the crossing compares closely with the original estimate of the width of the perpendicular street.</li> <li>• Similarly, unless the veer is severe, the distance from the starting corner to the crown appears to be similar to the distance from the crown to the traveler's location at the opposite curb.</li> </ul>
Proprioceptive Information	<ul style="list-style-type: none"> <li>• The crown appears to incline, then level off, then maintain or decline in a lateral (sideways) direction toward the nearest curb, rather than in a forward direction.</li> </ul>	<p>Not typically helpful, but consider the following:</p> <ul style="list-style-type: none"> <li>• The position of the street's crown and camber both appear correct.</li> </ul>
Tactile Information	<ul style="list-style-type: none"> <li>• Contact is made with the parallel curb instead of the perpendicular curb.               <ul style="list-style-type: none"> <li>◦ The side on which the curb is found will indicate if the traveler has veered slightly into the parallel street (see Figure 4.01c) or made</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Contact is made with the perpendicular curb.</li> <li>• The angle of the traveler's foot to the contacted curb potentially indicates the direction of veer (in case of an extreme veer).               <ul style="list-style-type: none"> <li>◦ For example, if her right foot is closer to the curb than her left,</li> </ul> </li> </ul>

Available Information	Toward the Parallel Street	Away From the Parallel Street
	<p>a diagonal crossing (see Figure 4.01d).</p> <ul style="list-style-type: none"> <li>• Contact is made with the front or back of a parked vehicle. <ul style="list-style-type: none"> <li>○ Note that in some cases, cars are parked perpendicularly to the curb. The traveler must rely on traffic sounds and other clues to assist in this situation if she is in an unfamiliar area.</li> </ul> </li> <li>• Contact is made with an idling parallel vehicle.</li> </ul>	<p>she has veered to the left (and vice versa). Use of such information, however, may be reliable only in areas with square corners.</p> <ul style="list-style-type: none"> <li>• Contact is made with the sides of parked vehicles. <ul style="list-style-type: none"> <li>○ Note that in some cases, cars are parked perpendicularly to the curb. The traveler must rely on traffic sounds and other clues to assist in this situation if she is in an unfamiliar area.</li> </ul> </li> <li>• Contact is made with an idling perpendicular vehicle.</li> <li>• Contact is made with a median strip that does not extend into the crosswalk.</li> <li>• When clearing at a destination corner, contact is made with objects usually located away from the corner (e.g., grass parkways, bushes, trees).</li> </ul>
Auditory Information	<ul style="list-style-type: none"> <li>• Consider the close proximity of parallel traffic sounds and the relatively far distance of perpendicular traffic sounds (e.g., sounds of idling perpendicular traffic).</li> </ul>	<ul style="list-style-type: none"> <li>• Consider the close proximity of perpendicular traffic sounds and the relatively far distance of parallel traffic sounds.</li> <li>• The sound of parallel traffic may appear to be more behind the</li> </ul>

Available Information	Toward the Parallel Street	Away From the Parallel Street
	<ul style="list-style-type: none"> <li>• The sound of parallel traffic appears to be more in front of the traveler than on the side.</li> <li>• Note the location of pedestrian sounds.</li> <li>• Note the location of sounds on the destination corner relative to the traveler's present position.</li> </ul>	<p>traveler than on the side (in the case of an extreme veer).</p> <ul style="list-style-type: none"> <li>• Note the location of pedestrian sounds.</li> <li>• Note the location of sounds on the destination corner relative to the traveler's present position.</li> </ul>
Thermal and Cutaneous Information <sup>1</sup>	<ul style="list-style-type: none"> <li>• Sun</li> <li>• Wind</li> <li>• Heat from engines of idling traffic</li> </ul>	<ul style="list-style-type: none"> <li>• Sun</li> <li>• Wind</li> </ul>

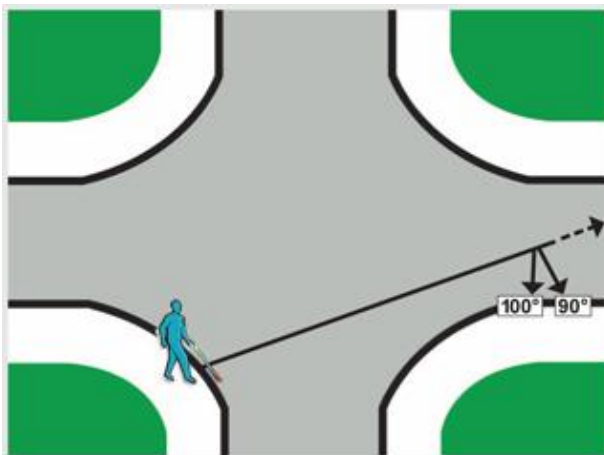
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<sup>1</sup> Such information may not be consistently available and may only give gross information relative to the veer; thus, it can be unreliable.

**Note:** Some travelers may intentionally veer away from the parallel street due to fear of traffic that is moving on that street. Except in special circumstances, intentional veering should not be encouraged because of the potential for contact with traffic on the perpendicular street and the additional time needed in the street to move around idling and/or parked cars and to locate the sidewalk following a veer.

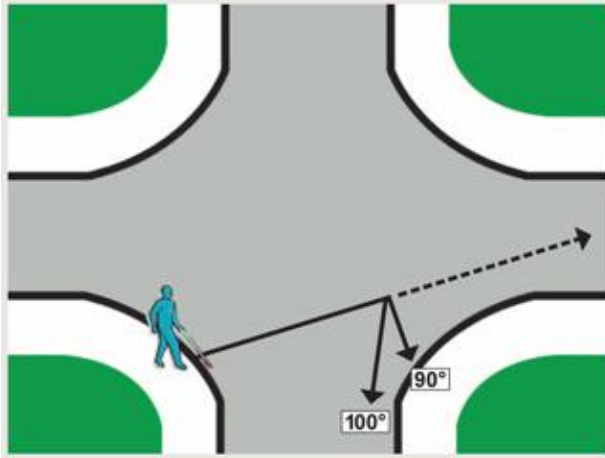
## Recovery from a Veer Into the Parallel Street

1. If the traveler realizes that she is veering before she has traversed the entire width of the street, she can alter her direction of travel to locate the destination corner.
  2. If the traveler believes that she has already passed the destination curb (indicating a veer into the parallel street), she should walk two more steps (in case her estimation of time-distance was premature); if the destination curb is not contacted, she should turn 90–100 degrees (toward the destination corner) and walk toward it (see Figure 4.02).
- Some orientation and mobility specialists recommend turning exactly 100 degrees to minimize the time in the street and/or minimize the distance to the curb (LaGrow & Long, 2011). If, however, the traveler has actually identified the veer before she has passed the corner by a substantial distance, this may cause her to bypass the corner and move into the perpendicular street (see Figure 4.03a). Turning less than 90 degrees can cause the traveler to walk in the street for an extended period of time (see Figure 4.03b; Hill & Ponder, 1976).



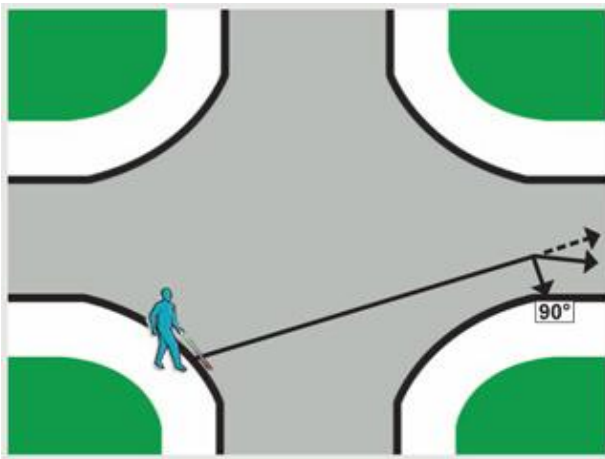
**Figure 4.02**

If the traveler believes she has already passed the destination curb, she should walk two more steps (as indicated by a long arrow ending in two dashes). If the destination curb is not contacted, the traveler should turn 90–100 degrees toward the destination corner (indicated by two small arrows labeled 100° and 90°) and walk toward it.



**Figure 4.03a**

If the traveler identifies the veer before she has passed the destination corner by a substantial distance, turning more than 90 degrees (indicated by arrows labeled 90° and 100°) can cause her to bypass the corner and move into the perpendicular street. A dashed line in this diagram represents the possible "substantial distance."



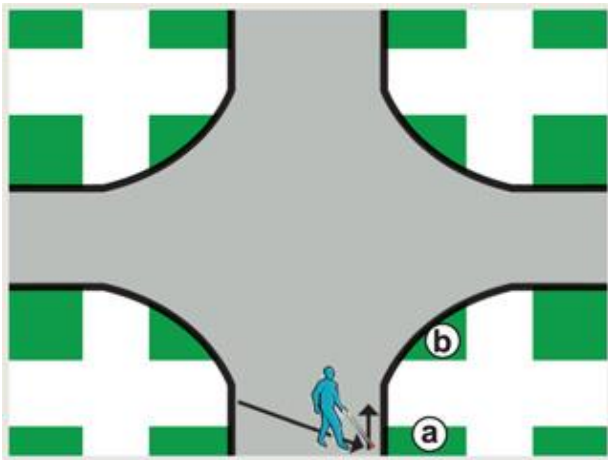
**Figure 4.03b**

Turning less than 90 degrees can cause the traveler to walk in the parallel street for an extended period of time. In this diagram, a long line ends with dashes and an arrow. Two other arrows show a turn of greater than 90 degrees and a turn labeled 90°.

## Recovery from a Veer Away From the Parallel Street

1. If the traveler fails to find the sidewalk when clearing at the destination corner (indicating a veer away from the parallel street or a late recovery from a veer into the parallel street), she should sweep her cane at sidewalk level from midline to each side to locate the sidewalk.
  - Since the majority of veers cause the traveler to arrive at the curb at a point distant from the corner, as opposed to the small area located at the point of the corner between the apex of the corner and the sidewalk, it may be most efficient to check to the parallel street side first (see Figure 4.04, Points [a] and [b]).

- Sweeping with the cane to each side will often help the traveler locate the sidewalk if she has only veered a few feet from her intended line of travel.



**Figure 4.04**

As shown by Point (a), the majority of veers cause the traveler to arrive at the curb at a point distant from the corner. As shown by Point (b), however, some veers cause the traveler to arrive at the small area located at the point of the corner between the apex of the corner and the sidewalk.

2. In an area with parkways—or if obstacles are detected at the destination corner (e.g., newspaper boxes)—consider the following:
  - If, while sweeping, the traveler **locates the sidewalk**, she follows the curb to the sidewalk using the THREE-POINT technique, then clears and steps up onto the sidewalk.

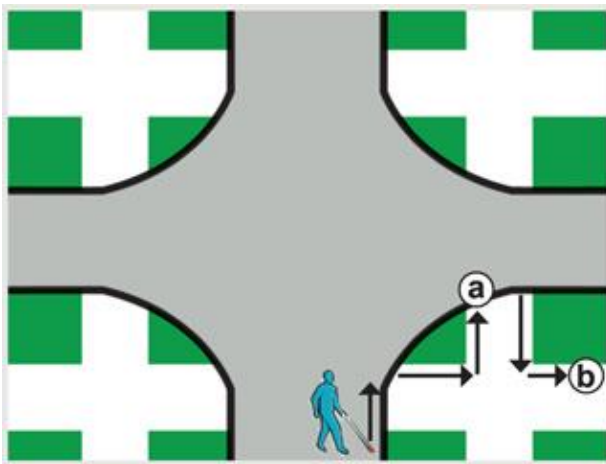
If the traveler **does not locate the sidewalk** while sweeping, she should turn toward the intersection and carry through with one of the following possibilities:

- **If there is no danger from traffic passing close to the curb**, the traveler can follow the curb using the THREE-POINT technique to locate the sidewalk, then clear and step up onto it.
- **If there is any potential danger from traffic passing close to the curb**, the traveler can step up onto the parkway immediately using the UPPER HAND & FOREARM (Modified) technique and do either of the following:
  - Follow the curb to the sidewalk using the TOUCH & DRAG technique, or
  - Cross over the parkway (if possible) using the UPPER HAND & FOREARM (Modified) technique to protect her face from contact with guy wires, low tree limbs, or other hazards that may be present. Upon reaching the perpendicular sidewalk, the traveler can then turn in her desired direction of travel (following the perpendicular sidewalk to the parallel sidewalk, if she wishes to resume travel in her original direction).

**Notes:** Consider the following ways that the traveler can determine whether she has arrived at the curb at Point (a) or at Point (b) (as labeled in Figure 4.05):

- If the traveler contacts a rounded curb, this may indicate that she has contacted the curb at a point between the sidewalk and the parallel street.
- Stop signs and other traffic and street signs are most often located a greater distance from the parallel street than is the sidewalk. Contacting one of these may indicate to the traveler that the sidewalk is located closer to the parallel street.
- Some corners are very gently rounded, making it difficult for the traveler to identify when she is rounding the apex of the corner in her effort to locate the sidewalk. A strategy to enable her to identify whether she has located the sidewalk that continues in her original direction of travel or whether she has passed the apex of the corner and located the perpendicular sidewalk is described below.

Here is an example of how to determine the traveler's exact position on the destination corner: If the parallel street is on the left when the traveler steps up on the sidewalk, she can follow the left grass line for four to five steps. If she finds a curb (see Figure 4.05a), she simply repeats the process to find her sidewalk (see Figure 4.05b).



**Figure 4.05**

After trailing the curb edge to locate the sidewalk, the traveler can verify that she has located the sidewalk that continues in her original direction of travel and that she has not passed the apex of the corner to locate the perpendicular sidewalk by following the sidewalk grass line on the parallel street side for 4–5 steps. Arrows in the diagram show the turning directions that the traveler (indicated by a blue pedestrian figure) takes in this scenario. If she finds a curb, she has verified that her veer was away from the parallel street (Point [a]). She then simply repeats the process to find the sidewalk continuing in her original direction of travel (Point [b]).

## Common Errors and Corrections

### Error:

The traveler fails to use the UPPER HAND & FOREARM (Modified) technique when crossing over a parkway.

### Correction:

Using the UPPER HAND & FOREARM (Modified) technique when stepping up onto a parkway enables the traveler to protect her face from bumping into objects, such as guy wires and low tree branches.

## Notes for Teachers

When initially presenting this technique, it is often helpful to guide a new traveler through the different recovery situations using the BASIC GUIDING technique before asking her to perform the technique independently. Doing so gives the traveler the opportunity to experience the sensory and environmental information that may indicate a veer, to practice maintaining her orientation, and to do the necessary problem solving based on that information, all without the stress of needing to simultaneously ensure her own safety from moving traffic.

Tactile maps may help convey the concept of veering and the relationship of the traffic to the traveler during a veer.

In areas without parkways, the traveler may be able to identify a veer away from the parallel street only after she has stepped onto the curb, walked forward a few steps, and then found her path blocked by a perpendicular shoreline in front of her (e.g., a front yard). In this case, she simply turns toward the parallel street and follows the shoreline to the sidewalk of the parallel street. Or, a more efficient method might be for the traveler simply to turn toward the parallel street and walk until she locates the down-curb at the intersection. She can then turn and resume travel in her original direction.

If the traveler consistently veers in one direction (either left or right), it may be due to physical factors like an uneven arc width, or due to postural factors like scoliosis that may tend to cause some natural trunk rotation. If the traveler consistently veers away from the parallel street, it could potentially be due to concern over getting too close to moving traffic.

Emphasize the applicability of this technique to negotiating median strips that cannot be traversed and to negotiating environmental situations in which the sidewalks on both sides of the street do not line up with one another (e.g., offset intersections and T-shaped intersections when crossing the top of the T). The latter situation will require the use of the RECOVERY FROM A VEER technique, even though the traveler may have



crossed the street with a straight line of travel if she did not start the crossing from an appropriate location.

## **Related Techniques**

Areas Without Sidewalks

Negotiating a Median Strip

Railroad Crossings

# SIGNALING DRIVERS

## Purpose

To indicate to drivers whether or not the traveler intends to begin crossing immediately

## Prerequisite Techniques

Signalized Intersections

Unsignalized Intersections

## Teaching Environments

Begin at an all-way stop-sign controlled intersection where there is regular, but a light volume of, traffic on the perpendicular street.

Practice signaling drivers of vehicles approaching on a trajectory that would cross the traveler's projected travel path from a variety of directions:

- The near lane of the perpendicular street (as if the traveler were preparing for a clockwise crossing)
- The near lane of the perpendicular street (as if the traveler were preparing for a counter-clockwise crossing)
- The near lane of the parallel street (as if the traveler were preparing for a counter-clockwise crossing)
- The near lane of the parallel street (as if the traveler were preparing for a clockwise crossing)

Practice these techniques at a variety of intersections (e.g., intersections with varying traffic controls, including both unsignalized and signalized).

## Skills

### Traveler Is Not Ready to Cross

This is an effective method for indicating to drivers who have stopped at an intersection that the traveler is not planning to cross at that time. Such signaling will often encourage drivers to move ahead, clearing the intersection for the traveler to cross when she is ready.

1. The traveler assumes a body position that clearly indicates that she is not ready to cross. For example:
  - The traveler moves one foot backward and places her cane at her side. By moving only one foot backward and keeping one foot in position, the traveler gives the impression of moving backward while maintaining her line of direction.

Some travelers also choose to turn their heads away from the street to reinforce the impression that they are not planning to cross at that time.

- The traveler brings her cane to a vertical position near her body. If she wishes, the traveler can turn her head to face the driver and then shake her head as if to say, "No, I'm not crossing now."

**Notes:**

- The traveler should never assume that an idling vehicle has stopped for her; while this may be true, it may also be possible that the vehicle has stopped for another reason and that the driver is not paying attention to the traveler.
- If the traveler hears a vehicle either stopped at an intersection or slowing to a stop when she is not yet ready to cross, she should never wave to the driver to go ahead. The driver may follow her direction without first verifying the safety of proceeding. This same precaution applies to the instructor as well.

## **Ready to Cross—Extra Arc**

Use this technique to increase drivers' awareness of the traveler. The movement of the cane has been shown to moderately increase the likelihood that drivers will yield to the traveler (Bourquin et al., 2014, 2018). There is no guarantee, however, that a driver will yield; the traveler must use her own judgment that it is safe to step into the street.

1. When the traveler is ready to cross the street, she swings her cane in a full arc to one side and then to the other side (two taps).
  - This allows the traveler time to verify her judgment that it is safe to cross and also attempts to signal drivers that she is about to leave the curb.
2. The traveler then steps off the curb in-step with the third arc and begins crossing the street.

## **Ready to Cross—Reversible Step**

This technique is used to increase drivers' awareness of the traveler. Research has shown that this method is one of the more effective ways to increase the likelihood that drivers will yield when turning across the traveler's path. There is no guarantee, however, that a driver will yield; the traveler must use her own judgment as to when it is safe to step into the street.

1. When the traveler is ready to cross the street, she takes one step down into the street (without entering a travel lane); she keeps this foot near the curb and her other foot above the curb and pauses again to verify that it is safe to cross. This approach is called a "forced detectable yield". Although no method of alerting drivers is foolproof, this motion most reliably causes drivers not to turn across the traveler's path, but rather to yield to the traveler (Bourquin et al., 2018).

- Another strategy that has been shown to increase the likelihood that drivers will yield is for the traveler to hold one hand up in the direction of the driver with her palm facing the driver, signaling him to stop (Bourquin et al., 2018).

## **Common Errors and Corrections**

None

## **Notes for Teachers**

None

## **Related Techniques**

None

# **TIMING**

# UNSIGNALIZED INTERSECTIONS

## Purpose

This technique is used to select the safest time to cross at intersections not controlled by traffic signals (i.e., uncontrolled, yield, and stop sign-controlled intersections) with varying amounts of traffic and varied traffic patterns, and to recognize situations in which it is not possible to select a safe time to cross.

## Prerequisite Techniques

Alignment  
Basic Crossing

## Teaching Environments

Street-crossing timings generally are sequenced from simple to complex, from quiet to congested, and from uncontrolled or stop sign-controlled to traffic signal-controlled intersections (also called "Signalized Intersections").

While the actual selection of teaching environments is generally dictated by the availability of specific intersection types in a traveler's area, there are several factors to consider in selecting "ideal" teaching environments. These factors include the volume of traffic at the intersection, traffic controls, and the direction of traffic flow.

## Traffic Volume and Flow

It is generally helpful to begin instruction at the intersection of two narrow streets (e.g., two driving lanes) with a low volume of traffic that travels at a low speed and where there are typically long and definite breaks in traffic. There should be good auditory visibility at the corner. Good auditory visibility refers to the ability to hear sounds of approaching vehicles with enough warning to be able to determine if it is clear to cross the street. Travelers should be able to recognize when they don't have good auditory visibility (Sauerburger, n.d.).

### No Traffic Present

A "No-Traffic-Present" street-crossing timing (sometimes called an "all-clear" crossing) is one in which there are breaks in traffic that are long enough for the traveler to cross. In order for travelers who rely on hearing to determine whether or not it is clear to cross, there must be good auditory visibility. Auditory visibility can be reduced with masking sounds, such as receding or idling traffic, leaf blowers, lawn mowers, etc.

- All-clear street-crossing timing is generally taught at intersections. The first crossing should be with same-direction near-lane parallel traffic, then with oncoming near-lane parallel traffic. This order is recommended, because it is usually easier for the traveler to detect the safest street-crossing timing and to

project a straight line of travel when she is crossing with same-direction near-lane-parallel traffic than with oncoming near-lane parallel traffic.

### **Traffic Present**

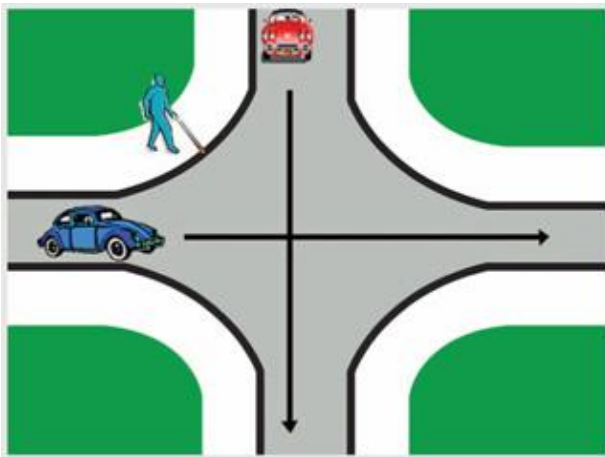
The first crossings with traffic present are often done at all-way stop sign-controlled intersections with light traffic on both streets (e.g., four stop signs at four-way intersections).

Later crossings often take place at two-way stop sign-controlled intersections, where perpendicular traffic must stop but where parallel traffic does not.

### **Direction of Traffic Flow and Turning Vehicles**

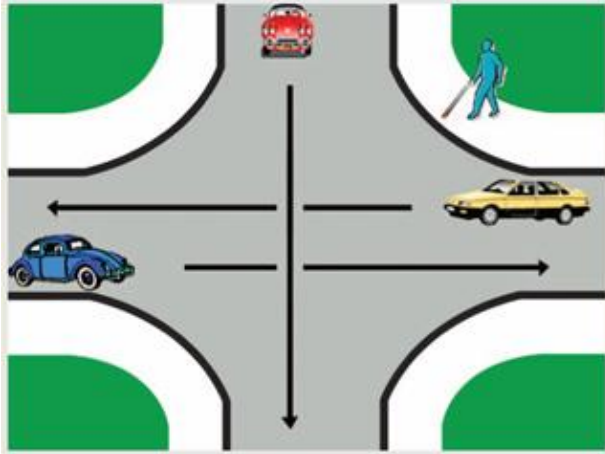
Initially, introduce street crossings with traffic present at intersections where vehicles are not allowed to turn right from the parallel street onto the perpendicular street (across the traveler's path). The following outline is one suggested progression:

- Two one-way streets (see Figure 5.01)
- Perpendicular one-way and parallel two-way streets (see Figure 5.02)



**Figure 5.01**

This diagram depicts two one-way streets (indicated by a car and a one-directional arrow in each street). The traveler (blue pedestrian figure) is positioned so that no cars can turn immediately in front of her.



**Figure 5.02**

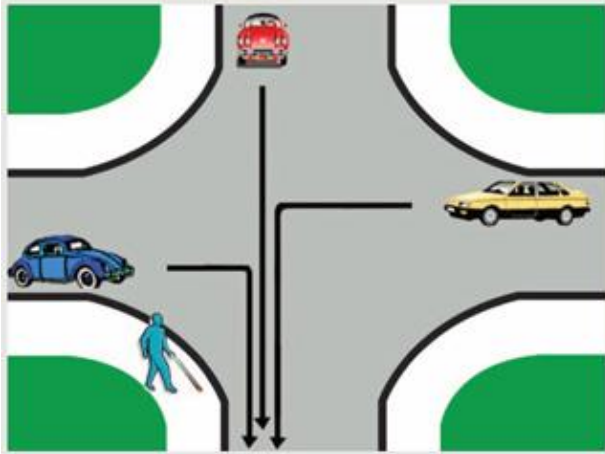
This diagram shows a perpendicular one-way and parallel two-way street. The diagram uses cars and directional arrows to show the traffic patterns. The traveler (a blue pedestrian figure) is positioned so that no cars can turn immediately in front of her as she steps off the start corner.

The first crossing should be with same-direction near-lane parallel traffic, then with oncoming near-lane parallel traffic. This order is recommended because it is usually easier for the traveler to detect the safest street-crossing timing and to project a straight line of travel when she is crossing with same-direction near-lane parallel traffic than with oncoming near-lane parallel traffic.

Introduce turning traffic in the following ways:

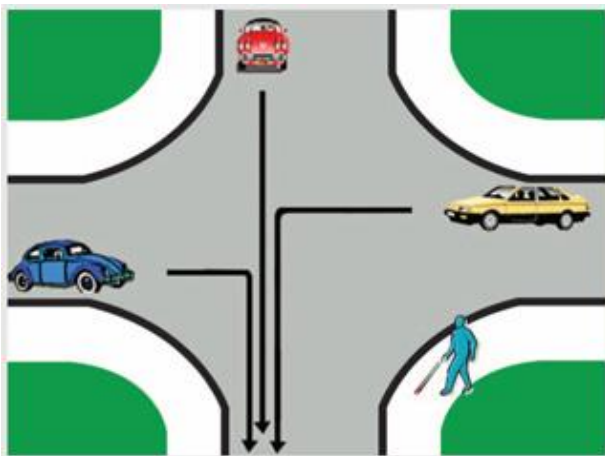
- Cross with the same-direction near-lane parallel traffic at an intersection with two two-way streets (counterclockwise crossing with the parallel street on the left; see Figure 5.03).
- Cross with the oncoming near-lane parallel traffic at an intersection with two two-way streets (clockwise crossing with the parallel street on the right; see Figure 5.04).





**Figure 5.03**

This diagram shows two two-way streets that place the potential for turning traffic in the first half of the crossing. (Cars and arrows show traffic directions, and a blue pedestrian figure represents the traveler.)



**Figure 5.04**

This diagram shows two two-way streets that place the potential for turning traffic in the second half of the traveler's crossing. (Cars and arrows show traffic directions, and a blue pedestrian figure represents the traveler.)

**Note:** Many travelers find it easier to align with same-direction near-lane parallel traffic and, therefore, find it easier to cross intersections in a counterclockwise direction (with the parallel street on the left). Doing so, however, places right-turning traffic from the near parallel lane onto the perpendicular street immediately in front of the traveler as she steps off the curb (shown in Figure 5.03). Crossing with oncoming near-lane parallel traffic positions the traveler so that traffic turning across her path will do so in the second portion of the crossing (shown in Figure 5.04) where many travelers feel that their movement is more readily visible to drivers. The decision to begin with clockwise or counterclockwise crossings for the purpose of teaching the traveler how to deal with turning traffic can be made on an individual basis.

As the traveler develops skill in determining appropriate timings to cross intersections in the above environments, additional instruction is provided at intersections with the following characteristics:

- Wider streets,
- Increased volume of traffic,
- A variety of traffic patterns and unsignalized controls (e.g., uncontrolled, yield, two-way vs. all-way stop sign-controlled).

## Skills

### Street-Crossing Timing—No Traffic Present

To cross safely at an uncontrolled crossing or one controlled by a yield sign or stop sign. This skill incorporates all aspects of the skill entitled, "Basic Crossing."

1. Assuming there is sufficient auditory visibility, the traveler crosses after confirming the all-clear (see the section "Traffic Volume and Flow," above, for more information about all-clear).

#### Notes:

- This procedure also applies to crossing a street controlled by a yield sign.
- Some uncontrolled streets can be unsafe places to cross due to traffic volume, speed of traffic, width of the street to be crossed, visibility factors (ability of traveler to hear the approaching cars and ability of the driver to see the traveler), and traveler's walking pace. The traveler should determine whether she can detect approaching vehicles with enough warning to know that she has time to complete the crossing before any vehicles could reach her and that she should not begin a crossing when there is an unacceptable risk that drivers will be approaching who will not yield to her.

In her work, "Preparing Visually Impaired Students for Uncontrolled Crossings," Sauerburger (n.d.) designed a protocol to help travelers improve their skill at recognizing situations in which they cannot hear approaching traffic with enough warning to judge if it would be clear to cross. In essence, this strategy calls for the traveler to compare the range of warning times of approaching vehicles with her crossing time.

### Street-Crossing Timing—Traffic Present

At some intersections, traffic on the parallel or perpendicular streets is consistently busy enough that it's not possible to get an all-clear. Such intersections are generally controlled by stop signs or yield signs on at least one of the streets or are controlled by a traffic signal. Procedures for crossing at an intersection that is controlled by a traffic signal are described in SIGNALIZED INTERSECTIONS.

## **All-Way Stop Sign-Controlled Intersections**

1. The traveler can either cross with an all-clear or begin her crossing as she hears the vehicle in the near lane (the traffic lane closest to the sidewalk) of the parallel street come to a complete stop at the intersection and then begin to move forward through the intersection (without turning across her path).
  - Timing her crossing to begin as the near-lane parallel vehicle first enters the intersection affords the traveler the maximum amount of time to complete her crossing before vehicles on the perpendicular street begin to move.
  - Beginning the crossing as the near-lane parallel vehicle moves through the intersection allows that vehicle to block vehicles turning from the parallel street onto the perpendicular street across the traveler's path (LaGrow & Long, 2011).
2. The traveler steps off the curb after establishing that:
  - Traffic on the perpendicular street is stopped.
  - Traffic on the perpendicular street has not pulled into the crosswalk before stopping. This may be difficult to discern if the vehicle is not in the lane closest to the curb. If, during her crossing, the traveler encounters a car that has pulled into the crosswalk area, she can walk around it using the VEHICLE IN THE CROSSWALK technique.
  - The same direction near-lane parallel vehicle is moving forward (either going straight or turning left) and not turning right onto the perpendicular street in front of her.
  - The oncoming near-lane parallel vehicle is moving forward (going straight) and not turning right, onto the perpendicular street.
    - A right-turning vehicle is most often a concern when the vehicle in the near parallel lane turns into the near curb lane of the perpendicular street and, therefore, turns immediately across the traveler's path. To help attract the attention of the driver to her presence and increase the likelihood that the driver will yield to her, the traveler may perform the EXTRA ARC, the HAND UP, and/or the REVERSIBLE technique (described under "Signaling Drivers").
  - The traveler monitors her line of travel as she crosses the street by listening to both parallel traffic and the idling engines of any vehicles pulled up to the crosswalk on the perpendicular street. Both are sources of auditory information that can help her confirm that she is crossing without veering and that she is in the crosswalk area.

## **Two-Way Stop Sign-Controlled Intersections**

### **Crossing the stop sign-controlled street**

1. The traveler can either cross with an all-clear or, as she identifies an approaching vehicle in the near lane of the parallel street that is moving too fast to turn, she can enter the intersection when that approaching vehicle enters the intersection. This timing must be very precise, however, because if the traveler steps off the curb too late, the driver of a vehicle that may be turning from the far lane in the parallel

street could have his or her view of the traveler blocked by the first vehicle and turn into her crosswalk after the first vehicle clears the intersection.

- Timing her crossing to begin as the near parallel vehicle first enters the intersection allows the maximum time to cross before the cars on the perpendicular street begin to move.
- It is important for the traveler to always verify that the vehicle is going straight through the intersection and not turning across her path before she steps off the curb.
  - Experienced travelers can often predict whether it is likely that a near-lane vehicle on an uncontrolled parallel street will turn in front of them onto the perpendicular street by listening to the sound of the vehicle's motor and tires. If the sound appears to be slowing, it may be an indication that the vehicle is planning to turn at the corner; if the sound continues at a steady speed, it may indicate that the vehicle will continue through the intersection without turning. Because driving patterns can sometimes be unpredictable, however, the traveler should use her own judgment in determining if it is safe to begin crossing.

### Crossing the uncontrolled street

Crossing an uncontrolled street when traffic is moving through the intersection from a stop sign in the parallel street is not a reliable strategy (Scheffers & Myers, 2012; Fazzi and Barlow, 2017). The parallel vehicle can block the traveler from the view of drivers on the perpendicular street while masking the sound of traffic approaching the traveler, and the parallel vehicle will generally clear the intersection more quickly than the traveler, leaving her vulnerable to approaching traffic on the perpendicular street.

When crossing an uncontrolled through-street, the only reliable timing is all-clear where there is good auditory visibility. Research has found that there are situations where auditory visibility is insufficient, such that even when it is quiet with no masking sounds, it is not possible to hear all approaching vehicles with enough warning (Wall Emerson & Sauerburger, 2008). This means that the traveler should be taught strategies to recognize situations in which she cannot reliably determine crossable gaps in traffic (Sauerburger, 2008), understand the risks involved in crossing in these situations, and know available alternatives that can be used when these risks are not acceptable (e.g., soliciting assistance, crossing at a different location where there are traffic controls, or even taking a bus ride, if necessary, and getting off on the return trip where the bus will let her off on the other side of the street at that location).

### Safety Notes

**Caution:** When the parallel street is on the traveler's left side, same-direction near-lane parallel vehicles can temporarily block the traveler from the view of drivers approaching from the left on the perpendicular street or turning onto the perpendicular street from the far-lane position. The traveler should always listen for moving traffic that could cross her path. If, immediately after stepping off the curb, the traveler deems it unsafe

to continue the crossing, she can either pause before entering the driving lane or step back onto the curb.

After determining that it is safe to begin crossing, the traveler should not hesitate excessively before stepping off the curb, because she may miss the safe timing, and other vehicles at the intersection may start to move across her path.

If, while the traveler is no more than a few steps from the curb, she hears a vehicle approaching such that it will cross her path, she can step back onto the curb. If she is farther from the curb than a few steps, it may be risky to return to the curb because drivers generally expect pedestrians in crosswalks to continue walking forward and may plan to pass just behind the traveler. In each situation, the traveler must use her own judgment.

If in doubt about the safety of any crossing, don't cross.

## Common Errors and Corrections

### Error:

The traveler waits too long and begins her crossing when the near-lane parallel vehicle reaches the far side of the intersection.

### Correction:

The traveler should begin crossing when the near-lane parallel vehicle just enters the intersection. Correct timing enables the near-lane parallel vehicle to provide the traveler with some protection from moving perpendicular traffic and from far-lane parallel traffic that could turn across the traveler's path. Also, stepping off the curb after the vehicle has passed (but before its motor sounds fade) can place the traveler in the path of perpendicular traffic whose sound may have been masked by the sound of the first vehicle.

### Error:

At a two-way stop sign-controlled intersection (where the stop signs are on the perpendicular street), the traveler begins crossing when she hears the sound of the near-lane parallel vehicle slowing as it approaches the intersection.

### Correction:

The traveler should wait until it is either all-clear or until she hears a near-lane parallel vehicle begin to go straight through the intersection before she steps off the curb. The sound of a slowing motor may indicate a vehicle preparing to turn and may also mask the sound of another vehicle that may cross the traveler's path. Waiting until it is either all-clear or until the near-lane parallel vehicle starts to go straight through the intersection prevents the traveler from inadvertently stepping into the path of a turning vehicle.

# Notes for Teachers

## Intersection Analysis

In preparing to cross the street, the traveler performs an intersection analysis in order to determine whether that intersection is a safe location at which to cross and, if it is, to then identify the safest time to cross.

In analyzing the intersection, the traveler considers the following features:

- Traffic controls (i.e., uncontrolled/yield signs, stop signs, traffic signals)
- Shape of intersection (e.g., four-leg-right-angle, T, Y, skewed, offset, roundabout)
- Direction of traffic flow (e.g., one-way or two-way traffic on each street)
- Distance of traffic sounds in the farthest perpendicular lane that can give the traveler a sense of how many driving lanes there might be on the perpendicular street as well as the possible presence or absence of parking lanes
  - This knowledge of the width of the street can help the traveler determine the time that would be needed to cross the street. This crossing time, combined with the time from detection to the time of arrival of approaching vehicles (warning time) can help the traveler identify situations in which she cannot determine if it is clear to cross.

## Traffic Controls

### Uncontrolled Intersections

Uncontrolled intersections are regulated by local or state right-of-way laws. When two vehicles simultaneously approach an intersection from perpendicular streets, the usual and customary law gives the right-of-way to the vehicle on the right. One exception to this rule occurs at T-shaped intersections, where the vehicle traveling along the top of the T has the right-of-way at all times.

### Yield Signs

Yield signs are not a common traffic control.

A yield sign dictates that a vehicle must slow down and, if necessary, stop before entering the intersection unless it can do so safely without interfering with the flow of vehicular or pedestrian traffic in the intersection.

Travelers should treat yield sign controls the same way as uncontrolled intersections.

### Stop Signs

A stop sign indicates that vehicles must come to a complete stop before entering the intersection, whether or not other traffic is present in the intersection or is approaching on the perpendicular street. Although illegal, some vehicles only slow instead of coming to a complete stop.

An all-way stop sign control—traffic on both streets controlled by stop signs (e.g., four-way stop sign control or three-way stop sign control at a T intersection) indicates that all traffic must stop before entering the intersection. After stopping, the vehicle that arrives at the intersection first will proceed first. If vehicles on the perpendicular and parallel streets arrive at the same time, then the vehicle to the right has the right-of-way.

At an intersection with two-way stop sign control, the controlled traffic will stop and yield the right-of-way to the traffic on the uncontrolled street. The uncontrolled street typically has a higher volume of traffic.

### **Traffic Signals**

Vehicles at a signalized intersection usually move in groups rather than one car at a time (e.g., as happens at a stop sign) in reaction to the traffic signal. This information can often be used to determine that an intersection is controlled by a traffic signal.

See “Signalized Intersections” for more information.

### **Right-of-Way Laws—Pedestrians and Traffic**

Most states have laws that give pedestrians the right-of-way in crosswalks, whether or not they are marked. In addition, states typically have laws pertaining to travelers who use white canes or guide dogs. In general, what are commonly referred to as “white cane laws” (although this name is not used in every state) require drivers to either stop or yield to pedestrians who are crossing the street using a guide dog or carrying a long cane. Regardless of right-of-way laws, the traveler should not assume that all drivers will yield the right-of-way but should use all street crossing skills to ensure a safe crossing.

### **General Points to Remember When Crossing Streets**

While crossing at intersections where no traffic is present often poses less anxiety for new travelers, more experienced travelers often find that the presence of traffic on the parallel street can help them to verify that they are aligned correctly to cross and to complete the crossing with a straight line of travel.

Crossing streets has obvious inherent risks. A great deal of time should be spent helping travelers develop the skills and self-confidence to determine when it is safe to cross the street and to understand situations where it is not possible to cross safely. Some travelers find learning to cross streets stressful. These travelers will benefit from additional, carefully planned and supportive, instruction.

- Standing on the start corner, the traveler can practice identifying safe crossing times and receive feedback from the teacher. When the traveler can consistently identify the safe crossing times, the teacher can have the traveler cross without verbal confirmation of safety. Doing so successfully helps the traveler build self-

confidence and trust in her own judgment. The teacher, of course, still monitors the new traveler and stops her from crossing if it is unsafe.

- It is important to remember that to the novice traveler, traffic may sound closer than it really is. Environmental conditions may affect traffic sounds. For example, rain and wind may enhance or distort sounds; snow can muffle sounds.
- The traveler should not cross if a siren, airplane, or other sound is heard that may mask traffic sounds. For example, the sound of a bus or loud vehicle, whether moving or just idling nearby, can mask the sound of quieter vehicles in the area. The traveler may either wait for the sound to fade or, if she wishes, she may ask for pedestrian assistance or change her route. With practice, the traveler learns to recognize when masking sounds affect their ability to detect approaching vehicles with enough warning to know that they would have time to complete the crossing before approaching traffic arrives.

The traveler should be aware of the following concerns when a bus or loud vehicle is passing through the intersection. She should not begin crossing when large and/or loud vehicles are present.

- Long vehicles such as buses or trucks often pull farther forward into the intersection before beginning a right-hand turn. In doing so, they may initially sound as if they will be traveling straight through the intersection, but then suddenly turn across the traveler's path.
- A large truck or bus can temporarily block the traveler from the view of drivers.
- When the traveler, while waiting to cross, hears a large vehicle making a right turn immediately in front of her, she may choose to momentarily step back from her waiting position at the curb edge. Some large vehicles, such as buses and trucks, can come up over the curb when making a tight right turn.

An important development that affects travel by people who are blind is the advent of electric and hybrid vehicles and of quiet gas-engine cars. Over about 18–20 mph, it is primarily tire noise that indicates the presence of vehicles. Under that speed, however, it can be more difficult to hear electric and hybrid vehicles as well as quiet gas-engine cars. This can be especially problematic when listening for the parallel surge of traffic at signalized intersections or when detecting moving vehicles at parking lots and driveways where slow speeds may make them difficult to detect.

- In response to these concerns, the Pedestrian Safety Enhancement Act of 2010, was signed into law January 2011. Its implementation was delayed for a number of years, but beginning September 1, 2019 in the US, all electric vehicles and hybrids are legally required to emit a warning noise whenever travelling under 18.6 miles per hour (30 km/h). According to the National Highway Traffic Safety Administration (NHTSA), the 18.6 mph cap is in place because at higher speeds adequate audible warnings, such as tire and wind noise, are said to provide adequate audible warnings to pedestrians.



Even when crossing at a familiar intersection, it is important to pay close attention to traffic sounds and patterns that indicate a change at that intersection that can affect crossing safety or efficiency. Changes might include such things as a stalled vehicle in the driving lane around which other vehicles are moving or a very large vehicle parked near the corner that blocks important traffic sounds. Traffic controls can also change (e.g., an all-way stop sign-controlled intersection becomes signalized, an uncontrolled crossing becomes stop sign-controlled, and a fixed-time signal becomes actuated).

The traveler should never begin a crossing in response to hearing a driver honk a horn. While a driver may honk his horn to indicate to the traveler that he sees her and will wait for her to cross, it is also possible that the driver honked for a completely unrelated reason and is neither aware of nor paying attention to the traveler.

A skilled traveler may use the combination of pedestrian movement and her own judgment of traffic conditions to determine the appropriate time to cross the street. As pedestrians may be crossing at an unsafe time, the traveler should not solely rely on the movement of other pedestrians when choosing the safest time to cross.

Similarly, the traveler should follow the line of travel of other pedestrians across the street only if she is certain that they are crossing directly to the destination corner (and not jaywalking or crossing to a point removed from the corner).

Travelers may also choose to solicit or accept unsolicited assistance to cross a street if they need or wish to do so. This assistance can take the form of either providing verbal direction or acting as a guide. Accepting assistance should not be regarded as a lack of independence. Especially for travelers who have limited mobility skills, effectively soliciting pedestrian assistance is actually a form of independent travel.

- With regard to accepting verbal assistance, such as a pedestrian's statement that it is okay to cross (especially if unsolicited), the traveler should only do so if she has first determined that it is actually safe to do so.

Should the traveler wish to communicate to drivers that she is not intending to cross immediately, she should see the section "Signaling Drivers" and use the TRAVELER IS NOT READY TO CROSS technique, which involves strategies like taking a step back away from the curb edge or shaking one's head "No." The traveler should never wave a car on or actively indicate to drivers that they should proceed forward. Drivers may follow her direction without first verifying that it is safe to proceed.

A very important principle to teach all travelers is "If in doubt, don't cross" (i.e., if travelers are not 100 percent sure of the safety of crossing timing, they do not cross).

## Related Techniques

Areas Without Sidewalks  
Negotiating a Median Strip  
Signalized Intersections  
Signaling Drivers

# SIGNALIZED INTERSECTIONS

## Purpose

To cross safely and efficiently at intersections that are controlled by traffic signals, including those with varying amounts of traffic and varying traffic patterns. This skill incorporates all aspects of the “Basic Crossing” skill.

## Prerequisite Techniques

Alignment<sup>1</sup>

Basic Crossing

Unsignalized Intersections<sup>1</sup>

Crossing streets at signalized intersections is generally taught after the traveler has had extensive exposure to traffic sounds and has demonstrated proficiency in unsignalized intersections, including the use of the APPROACH, ALIGNMENT, BASIC CROSSING, and RECOVERY FROM A VEER techniques.

**A Special Note:** There is a very specific vocabulary related to traffic signal controls that must be learned prior to teaching safe crossings at signalized intersections. The reader is encouraged to review the definitions of these terms in the glossary before continuing. Many of these terms will also be defined in the following paragraphs. Because intersection control is becoming increasingly sophisticated and complex, a thorough understanding of the following terms is recommended:

- All Clear
- Audible beacon
- Channelized lanes
- Cycle
- Intervals
  - Pedestrian clearance interval (also called “pedestrian change interval”)
  - Pedestrian DON’T WALK interval
  - Pedestrian WALK interval
  - Vehicular clearance interval
- Pedestrian button
- Phases
  - Pedestrian phase

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<sup>1</sup> While UNSIGNALIZED INTERSECTIONS is not an absolute prerequisite technique, it is common practice to teach street crossings first at unsignalized intersections where less traffic is present and students can become comfortable with skills such as intersection analysis, basic crossing, alignment, signaling drivers, and recovery from a veer.

- Exclusive pedestrian phase (also called “scramble phase”)
- Rest-in walk
- Roundabout
- Semi-actuated intersection
- Signals
  - Accessible pedestrian signal (APS)
  - Fixed-time signal (also called “pre-timed” signal)
  - Pedestrian countdown signal
  - Traffic-actuated signal

## Teaching Environments

Introduce street crossings with a traffic signal at two-phase, four-leg-right-angled intersections that:

- Have two near parallel driving lanes,
- Have moderate traffic on both the parallel and perpendicular streets,
- Do not have separate phases for turning traffic,
- Have few or no right-turning vehicles,
- Ideally, have signals that are fixed-time.

Having moderate traffic on each street can make it easier for the inexperienced traveler to distinguish the parallel and perpendicular traffic surges without the stress of dealing with a high volume of traffic. Having few right-turning vehicles makes it easier to initiate the crossing safely. Having a “fixed-time signal” (defined below) avoids introducing the complexities of actuation until students have mastered the basics. Having two near-parallel lanes increases the chances that, even if a car waiting to turn holds up traffic in one lane, there usually will be a clear near-parallel surge of straight-through traffic in the other lane. Another option is to begin at an intersection with an accessible pedestrian signal (APS) that would give accessible information about the WALK interval. See “Notes for Teachers” for more information on APS technology.

As the traveler develops skill in crossing at signalized intersections, additional instruction and experience is provided in crossing intersections with the following characteristics:

- Actuated signals,
- Increased and varying amounts of traffic,
- More complicated features (e.g., irregular intersections, T-shaped intersections, intersections with separate phases for turning traffic, intersections with separate channelized lanes for vehicles turning right).

## Skill

1. The traveler pushes the pedestrian button, if present. If she had to leave the crossing location at the curb in order to reach the button, she then returns to the crossing location, aligns, and positions herself to cross the street at the proper time.

- See “Notes for Teachers” for information about actuated traffic signals, using pedestrian buttons, and accessible pedestrian signals.
2. The traveler begins crossing at the beginning of the new green signal—or if a pedestrian signal is present, the WALK interval (typically indicated when the near-lane parallel traffic surges straight ahead) and after confirming that no vehicles are turning across her path (i.e., no right turners) and that perpendicular traffic has stopped (i.e., no red-light runners).
    - Beginning a crossing at the beginning of the WALK interval allows the following:
      - The traveler has the maximum amount of time to cross before traffic begins moving on the perpendicular street.
      - The traveler has the benefit from the “blocking” effect of the near-lane parallel surging cars.
      - The traveler can begin crossing before vehicles preparing to turn onto the perpendicular street have built sufficient speed to make stopping for the traveler difficult. Toward the end of the green or on a yellow light, some cars might accelerate in order to “beat the light” (i.e., get through the intersection or turn onto the perpendicular street before the light turns red).

**Note:** There are some very specific exceptions to the rule of using the surge of near-lane parallel traffic to identify the beginning of the WALK interval. For an explanation of these exceptions, see the section “Timing Exceptions” under “Special Challenges Posed by Modern Intersections,” below.

- The traveler should not assume that a single-vehicle near-lane parallel surge is a fresh green light. The sound of a single vehicle, for example, may simply be a car leaving a parking space, which can occur mid-phase. In the absence of an obvious surge of near-lane parallel traffic, it is often difficult to identify the beginning of the WALK interval or new green signal. If the traveler is unsure or misses the beginning of the pedestrian phase for any reason, she should wait for the beginning of the next green signal or WALK interval (after pressing the pedestrian button again, if there is one).
  - The traveler does not cross if noise is present that might mask relevant traffic sounds (e.g., bus, siren, airplane, large truck, loud motorcycle).
  - Using one of the techniques described under “Signaling Drivers” before stepping off the curb may help attract the drivers’ attention to the traveler and make it more likely that the driver will yield to the traveler.
3. As she crosses the street, the traveler monitors her line of travel by listening to parallel traffic and the idling engines of the perpendicular traffic.

## Common Errors and Corrections

### Error:

The traveler begins crossing late in the pedestrian phase, rather than at the beginning.

### Correction:

Starting to cross at the beginning of the pedestrian phase maximizes the amount of time the traveler will have to complete the crossing before the light changes. In addition, early in the phase, there are usually more near-lane parallel vehicles that can help “block” vehicles from turning across the traveler’s path.

### Error:

The traveler begins crossing with a far-lane parallel surge.

### Correction:

Many modern signalized traffic patterns prohibit pedestrians from crossing when the far-lane parallel traffic has the right of way, because those vehicles have a green arrow allowing them to turn into the pedestrian’s crosswalk. Therefore, the traveler should begin crossing only at the beginning of the surge of the near-lane parallel traffic, to help ensure that she will not inadvertently step into the path of far-lane parallel vehicles that have the right-of-way (note exceptions to this rule in “Notes for Teachers”).

### Error:

The traveler begins her crossing with the near-lane parallel surge of a bus.

### Correction:

Buses often stop to let passengers board or exit—and then surge late in the pedestrian phase. Travelers cannot rely on the surge of the bus to indicate the beginning of the new green/WALK interval. In addition, noise from the bus motor can mask the sound of nearby vehicles, such as those stopped in the crosswalk or those turning across the traveler’s path (Figure 6.01). Furthermore, because buses often pull far forward into the intersection before beginning their turn, they may initially appear to be traveling straight through the intersection but then turn across the traveler’s path unexpectedly.



**Figure 6.01**

Noise from the bus motor can mask the sound of nearby vehicles, such as those stopped in the crosswalk or those turning across the traveler's path.

## Notes for Teachers

The mechanics of crossing busy signalized intersections are the same as those used for crossing quiet residential streets, except that the traveler may often more easily use the heavier parallel traffic to establish a direction of travel for crossing or to correct the line of travel while crossing. In addition, the heavier parallel traffic sounds can make it easier for the traveler to identify the appropriate time to cross.

Vehicles at a signalized intersection typically act in groups rather than individually. This information can often be used to determine that an intersection is controlled by a traffic signal.

Consideration should be given as to whether instruction should begin at intersections where the signal is pre-timed (length of phases is set by the traffic engineer) or actuated (the length of each phase varies, based on the number of vehicles or pedestrians present). Many instructors prefer to start at fixed-time signals, and introduce the complexities of actuated signals later, and others start with actuated signals because there are no fixed-time signals in their student's teaching community, or because they want to present the "whole picture" from the beginning. Regardless of the order presented, it is essential that travelers understand the implications of actuated signals, which are explained in "Pre-timed vs. actuated signals."

The only way to verify that a specific traffic signal is pre-timed is to contact the agency that controls the intersection (e.g., the city's traffic engineering department). It is important to note, however, that a fixed-time signal can easily be changed to a traffic-actuated signal or can be fixed-time at certain times of day and actuated at other times of day.

At fixed-time signalized intersections where one street has a moderate-to-high volume of traffic and the other has a light-to-moderate volume of traffic, the following circumstances are pertinent:

- When crossing parallel to the busier street, typically the parallel street has a longer green light for traffic, giving the pedestrians a longer pedestrian phase to cross the less busy, and often narrower, street.
- When crossing parallel to the quieter street, typically the parallel cars have a shorter green light, giving the pedestrians less time to cross the busier, and often wider, street.

Crossing with the parallel street on either the left side or the right side each presents its own considerations.

- Clockwise crossings mean that the near-lane parallel surge is oncoming; some travelers find it more difficult to use oncoming traffic for alignment and for timing their street crossings, especially if the perpendicular street is very wide.
- Crossing in a counterclockwise direction (parallel street on the left) provides a same-direction near-lane parallel surge that some travelers find easier to hear and to use for alignment. However, a near-lane parallel vehicle planning to turn right can turn close to the curb and immediately across the traveler's path as she steps off the curb. Because the traveler is facing the perpendicular street, her cane is less visible to the driver; the driver may, therefore, be less likely to yield to her. Using the EXTRA ARC or REVERSIBLE STEP technique before stepping off the curb may help attract the driver's attention and make the driver more likely to yield to the traveler.

The sound of perpendicular traffic stopping may be an indication that the signal is about to change, but it cannot be used to reliably indicate that it is safe to cross. Traffic on the perpendicular street may stop for a number of reasons other than an imminent signal change:

- The vehicle may have stopped to let off a passenger or for an unexpected reason (e.g., to avoid hitting a pedestrian who is crossing against the light).
- The signal for perpendicular traffic may have been red for a while, and as vehicles on the perpendicular street come to a stop the signal may change to green.
- The vehicle may just be stopping as it yields to another vehicle coming from the opposite direction and making a left hand turn in front of it.
- Even though the signal for perpendicular traffic has changed to red, a separate turn arrow may have turned green for vehicles either turning from the parallel street onto the perpendicular street or from the perpendicular street onto the parallel street.

In most, but not all, cities in the U.S., drivers are permitted to make right turns on red lights after they stop to make sure no pedestrians or vehicles are crossing their street. They are also allowed, after stopping, to make left turns from a one-way street to



another one-way street. At some intersections, it is not permitted to turn right on a red light. Even though signs are posted at these intersections, the traveler should be aware that drivers may turn on red anyway. Another point of caution is that, as the light turns green for near-lane parallel traffic, a driver who has been waiting for an opening in the perpendicular traffic flow that would allow him to turn on red may begin his turn without first looking for pedestrians who may be starting to cross, so pedestrians need to be aware of this risk.

All pedestrians are required to follow pedestrian safety laws. Some of these laws prohibit:

- Crossing mid-block between two signalized intersections
- Knowingly starting a crossing when the red light for parallel traffic and/or the "DON'T WALK" indicator is lit

The traveler should not cross if sounds are present (e.g., siren, airplane, loud motorcycle) that might mask relevant traffic sounds.

The traveler should not cross when a large or loud vehicle is present at the intersection.

- Buses often stop at intersections when the traffic signal is green in order to let passengers board or exit. Consequently, a surge by a bus may occur late in the green phase and, therefore, should not be used to initiate a crossing.
- Long vehicles, such as buses or trucks, often pull farther forward into the intersection before beginning a right-hand turn. In doing so, they may initially sound as if they will be traveling straight through the intersection, but then suddenly turn across the traveler's path.
- The sound of a bus or loud vehicle, whether moving or just idling nearby, may mask the sound of quieter cars in the area.
- A large vehicle can block the traveler from the view of drivers.

If, while waiting to cross, the traveler hears a large vehicle in the near-parallel lane on her left begin to turn right immediately in front of her, she may choose to momentarily step back from the waiting position. Some large vehicles, such as buses and trucks, can come up over the curb when making a right turn.

Emergency vehicles, funeral processions, buses, or road construction crews can alter traffic patterns. Emergency vehicles, in particular, can wirelessly preempt the normal cycle and timing of traffic signals to get a green phase at every intersection. In such situations, the traveler can consider alternatives, such as waiting until the conflicting sounds diminish, altering her route, or soliciting assistance.

Traffic signals may switch to flashing operation at times, including late at night or because the signal is malfunctioning. When this happens, traffic patterns change and the traveler will not hear the typical surge to indicate the proper time to begin a crossing. If the signal for both the parallel and perpendicular streets is flashing red or is

not lit at all, traffic and pedestrians should treat the intersection as a four-way stop intersection. A yellow flashing light should be treated as a yield sign, and a red flashing light as a stop sign.

**Note:** When there is a change in the operation of a traffic signal, traffic patterns become less predictable. The traveler should use extra caution.

## Basic Principles for Signalized Intersections

When teaching a traveler how to cross at signalized intersections, it is important to provide instruction regarding modern traffic controls, actuation, and intersection design and their effect on a traveler's ability to accurately identify the safe timing to begin crossing the street. This includes information on how to analyze any potential crossing for safety, as well as information on the sequence and/or length of the phase lengths of many intersections, including the fact that at actuated signals the sequence and phases can change from one signal cycle to the next.

### Traffic signals, cycles, and phases

Traffic signals are cyclical and may have many different phase sequences per cycle. Here are some examples:

- All traffic on the parallel street followed by all traffic on the perpendicular street. "Permissive turns" are made during gaps in opposing traffic.
- There is a "protected turn" phase on one street, in which both left turning lanes of traffic (moving in opposing directions) on a street are provided a simultaneous and exclusive phase. A protected turn phase is called "leading" if it precedes movement on that street of straight-traveling traffic and "lagging" if it follows the movement of straight-traveling traffic on that street. A typical sequence would be turning traffic from both directions on a north-south street, followed by north and south straight-traveling traffic, followed by traffic on the east-west street.
- Split phasing allows all traffic moving in a general direction to have the green light at the same time. For example:
  - All straight-traveling and turning traffic traveling from one direction (e.g., northbound)
  - All straight-traveling and turning traffic traveling in the other direction on that street (e.g., southbound)

There are many different combinations of phases that can cause confusion for pedestrians because the phases are not consistent in order or in length at actuated intersections. At actuated signals, the only way to ensure that there is enough time to cross is to press the pedestrian pushbutton and cross during the pedestrian WALK signal. In the absence of an accessible pedestrian signal, it can be difficult for the traveler with a visual impairment to identify the WALK interval or fresh green signal. See the section entitled "Accessible Pedestrian Signals" for more information on this subject.

## Pre-Timed vs. Actuated Signals

Traffic signals can be fixed-time (pre-timed), actuated, or semi-actuated.

- Fixed-time traffic signals operate with each street receiving a predetermined time for vehicles and pedestrians. This time is constant but may be set for different lengths of time for different times of day and/or days of the week; however, it does not change as a result of changes in traffic volume in the moment.
- Actuated traffic signals change based upon the volume and location of traffic. A detector is present to monitor the volume of traffic. One example of detectors is an induction loop (typically seen as a scored line in the pavement; the loop detects the metal in vehicles' frames). Another example is a video sensor (a scope mounted on a pole or crossbar at an intersection).
  - Actuated signals can be fully actuated (the signal for traffic in all lanes is based on the detection of vehicles in those lanes) or semi-actuated (only some approaches, such as the minor street and/or left-turning lanes, are actuated). A semi-actuated intersection is the one most commonly seen and is usually found at an intersection of a major street with a minor street. Often, the minor street and some left-turning lanes have traffic detectors; traffic on the major street will have a continuous green light unless a vehicle approaches the intersection on the minor street or a pedestrian pushes the button to cross the major street. The WALK signal may remain illuminated to cross the minor street until the controller is signaled to change (called "rest-in-walk") or the DON'T WALK signal will remain illuminated until a pedestrian pushes the pedestrian button and an "Instant Walk" is displayed.

It can be difficult for the traveler to be certain whether a signal is fixed-time or actuated. For example, when traffic is congested, an actuated signal may appear to be fixed-time because the timing for each phase is maxed-out and therefore seems consistent. The only way to verify that a signal is fixed-time is to talk with the traffic engineer, with the understanding that traffic signals can be modified at any time (i.e., a fixed-time signal can be changed to a traffic actuated signal and vice versa). It is, therefore, best to assume the signal is actuated.

## Pedestrian Signals

In addition to red, yellow, and green signals and arrows to direct vehicular traffic, many intersections also have pedestrian signals specifically designed to direct pedestrian crossings. If a pedestrian signal is present, the pedestrian should obey its signal. In many states, pedestrian signals and pushbuttons are required at all actuated signals.

Definitions of various pedestrian signal displays follow:

- The **Pedestrian WALK interval** is indicated by a lighted pedestrian signal with either the word "WALK" showing in steady, white letters, or by the white figure of a person walking. If pedestrians who walk at an average speed start their crossing during this interval, they will have time to finish their crossing.

Pedestrians should still monitor traffic before stepping off the curb and throughout the crossing.

- The **Pedestrian Clearance Interval** (also called the “change interval”) is indicated by a flashing lighted pedestrian signal with either the words “DON’T WALK” showing in flashing orange letters or a flashing orange upraised hand. During this interval it is too late to start crossing; pedestrians who have already started to cross, however, will have time to complete the crossing if they walk at an average speed.
- The **DON’T WALK interval** is indicated by a steady lighted pedestrian signal with either the words “DON’T WALK” showing in steady orange letters or a steady orange upraised hand. At this time, the pedestrian should not be in the crosswalk.

#### Notes:

- The Pedestrian WALK interval and the Pedestrian Clearance Interval, when combined, comprise the Pedestrian Phase.
- A Pedestrian Countdown Signal is becoming increasingly common at signalized intersections. This device displays the number of seconds left in the pedestrian clearance interval.
- At intersections without pedestrian signals, the combined time allotted for the green and yellow lights for near-lane parallel traffic defines the length of time the pedestrian has to cross the street. Actuated signals without pedestrian signals (which exist in some states) may not provide sufficient time for pedestrians to cross.

### Using pedestrian buttons

Actuated traffic signals are becoming the “norm,” especially in suburban and rural intersections. And while some signals operate in an actuated manner at all times, others operate in either a fixed-time or actuated manner at different times of day or under varying traffic conditions. It can be challenging to determine whether a given signal is actuated at a specific intersection and at that specific time and day. Unless the traveler is certain that the signal is operating on a fixed-time schedule, therefore, she should assume that it is actuated.

At intersections where the traffic signal is actuated, traffic gets a green signal that is long enough to allow the vehicles to get through the intersection. If there is only one vehicle waiting to cross, the signal may be green for only a few seconds – not nearly long enough for pedestrians to cross the street. Pedestrian buttons can provide people the time they need to cross.

Pressing the pedestrian button sends a message to the computerized controller of a traffic signal to call for this pedestrian phase that is indicated by a “WALK” signal. The pedestrian phase is timed to allow pedestrians who are walking at an average speed (3.5 feet/second) enough time to complete the crossing, assuming that they start to

cross when the WALK signal is still on (note that travelers who walk significantly slower than the average pedestrian still may not have enough time to complete the crossing). If the pedestrian phase/WALK signal is not called by pushing the pedestrian button at these intersections, the signal may not provide more than a few seconds to cross. Therefore, if there is a pedestrian button, it should always be pushed, and the pedestrian should always start to cross when the pedestrian signal indicates WALK.

However, not all pedestrian signals are accessible (audible and vibratory); if that is the case, determining when the WALK signal is on can be a challenge for pedestrians who are blind. The best strategy is to use the pedestrian button and cross in the following way:

- After establishing her location at the corner from which to begin her crossing, the traveler makes note of any landmarks that will help her return to that spot quickly and align after pressing the pedestrian button.
- The traveler listens for a locator tone to locate the pushbutton (see Accessible Pedestrian Signals below). If no tone is heard, the traveler uses a systematic search pattern along the curb and along the inside and outside shoreline of the sidewalk until she locates the pole to which the pedestrian button is mounted.
  - Poles with pedestrian buttons can be located next to the crosswalk or they can be several feet away; they can be on the inside or outside shoreline of a sidewalk. Because there is no consistent placement of pedestrian buttons at corners, and if there is no audible indicator of their presence, it can sometimes be difficult for a pedestrian to know if a pedestrian button is present and, if so, where it is.
- The traveler presses the appropriate pedestrian button for her desired crossing while the perpendicular traffic is in motion. She then positions herself at the curb for the crossing. She begins crossing with the next surge of the near-lane parallel traffic. If she fails to begin crossing at that opportunity, she returns to the pedestrian button and repeats the process of pressing the button and crossing at the next opportunity.
  - Regulations require that the faceplates on which pedestrian buttons are located be aligned on the pole parallel to the direction of anticipated travel across the street. This is done to indicate which button calls the pedestrian phase for which street crossing, but there are many installations which do not comply.

### **Accessible Pedestrian Signals (APS)**

The range and scope of APS features and designs are great; and the type of signals most commonly used varies in different parts of the world. Some of the APS features described are more prevalent in some countries than in others. A comprehensive discussion of them is beyond the scope of this curriculum. The reader is encouraged to consult other publications for more in-depth discussions of this topic. However, this section provides a brief overview of pertinent issues.

Complex signal timing, varied intersection geometries (e.g., very wide streets, skewed or offset crossings, one-way streets), and quiet cars have made it more difficult to determine the WALK interval. Unfortunately, the traffic volume and patterns at some intersections do not provide enough information to reliably determine the beginning of the WALK interval. For travelers who are unable to see the pedestrian WALK signal or the traffic lights, crossing at such intersections can be challenging and risky. For these situations, an APS gives the traveler access to the pedestrian signal information and makes it possible to cross the intersection more safely.

According to the Manual on Uniform Traffic Control Devices (U.S. Department of Transportation Federal Highway Administration, 2009), an accessible pedestrian signal is “a device that communicates information about pedestrian timing in nonvisual format such as audible tones, verbal messages, and/or vibrating surfaces.”

An APS may have overhead speakers and/or a pedestrian pushbutton-integrated system with speakers at the pushbutton. If it is pushbutton-integrated, it may have a locator tone during the pedestrian clearance and DON'T WALK intervals to alert the traveler to the presence and location of the pedestrian button. The locator tone may be a low-volume slow ticking or beeping sound.

- Although accessible pedestrian signals can differ markedly in terms of both the type of information provided and the way information is conveyed, they minimally indicate the WALK interval. The WALK interval may be indicated by: (a) the same tone as the locator tone but at a faster rate, (b) a rapid “tick” sound that is different from the locator tone, or (c) a speech message. In addition, a raised, vibrating tactile arrow (which should be aligned with the direction of travel) may accompany the WALK indication. An example of a speech message to indicate the WALK interval is, “Grove, Walk Sign is on to cross Grove.” Many newer signals adjust their volume in reaction to the level of ambient environmental sounds.
- During a rest-in-walk situation, the accessible pedestrian signal will not sound continually; the auditory and vibrotactile features will activate when the pedestrian button is pressed.
- An APS only indicates that the WALK interval has begun; it does not ensure that a vehicle on the perpendicular street has actually stopped or that a vehicle on the parallel street is not turning across the traveler’s path. For this reason, the traveler should monitor traffic herself to be sure it is safe to begin the crossing.
- An audible beacon is a feature present at some intersections in which a louder tone is emitted from a speaker on the destination corner. Travelers can use this tone to assist in a straight line of travel toward the destination corner.
- Sometimes, an APS has an option called an “extended button press.” When the pedestrian button is pressed for more than one second, this option activates accessibility features, such as a verbal message (e.g., “Wait to cross 19th at Holloway”), a locator beacon, and an extended time for crossing the street.

- Sometimes, an APS has a tactile map feature in which a raised map showing relevant features of the crossing is mounted on the post. These features might include such things as the number of lanes in the perpendicular street, the presence of a bicycle lane or streetcar tracks, the presence of a channelized island (separating the lane for turning traffic from the other lanes) and/or median strip, and the direction of traffic movement in each lane. Additionally, some signals will have braille, raised letter, or large print signs that provide the name of the street to be crossed.

The traveler should be aware that when the WALK indicator stops, the pedestrian clearance interval has begun. She should finish her crossing before the end of the pedestrian clearance interval. The next phase of moving traffic begins after the pedestrian clearance interval.

When deemed necessary, the traveler and/or orientation and mobility specialist can contact the agency that controls the intersection (e.g., the city's traffic engineering department) to request the installation of an APS or a longer pedestrian phase.

### **Pedestrian Beacons**

Pedestrian beacons are found at uncontrolled, marked crosswalks. These crosswalks may be at an intersection or mid-block. The beacons control traffic at these locations to allow pedestrians to cross. Two common beacon systems are described below.

#### **High-intensity activated crosswalk (HAWK)**

The HAWK consists of a three-light system (2 red lights above a yellow light) that is activated by a pedestrian pushbutton (see Figure 6.02). The lights are unlit until the system is activated, at which time the HAWK will first display a flashing yellow light followed by a solid yellow light, and then a solid red light, at which time a WALK signal may also become illuminated for the pedestrian. When traffic stops, the pedestrian may cross the street, but only if he or she has verified that all traffic has stopped.

- As a note, the HAWK system would require an APS for the WALK indication to be accessible to the traveler who is visually impaired.





**Figure 6.02**

The High-Intensity Activated Crosswalk (HAWK) consists of a three-light system (two red lights above a yellow light) that is activated by a pedestrian pushbutton. The traveler shown here is walking in the crosswalk, below a HAWK beacon.

After a set interval, the solid red light changes to alternating flashing red lights (called a wigwag flashing red signal). Similar to a blinking red light on a standard traffic signal, these flashing lights require drivers to stop and proceed only when safe. After another set interval, the HAWK returns to its standard unlit state.

### **Rectangular rapid flash beacon**

Rectangular Rapid Flash Beacon (RRFB) devices consist of two rectangular-shaped yellow indicators, each with an LED-array-based light source, that produce an irregular high frequency flash pattern when activated (see Figure 6.03). RRFBs can be activated manually via a pedestrian push button or passively via a pedestrian detection system. RRFBs are often used in combination with a pedestrian, school, or trail crossing warning sign at an uncontrolled intersection or mid-block crosswalk. Their primary function is to alert drivers to the presence of a crosswalk—vehicles are not required to stop when the RRFB is activated, but drivers are alerted to yield to pedestrians who may be crossing. As the drivers may not yield, RRFBs are not as safe for the pedestrian as the HAWK system.





**Figure 6.03**

Rectangular Rapid Flash Beacon devices consist of two rectangular-shaped yellow indicators, each with an LED-array-based light source, that produce an irregular high frequency flash pattern when activated. The traveler shown here is walking in the crosswalk toward the RRFB device; inset shows a close-up photo of the device.

## Special Challenges Posed by Modern Intersections

Changes and advances are happening rapidly in the design of traffic controls; the shape and overall design of intersections is becoming increasingly complex with the inclusion of more channelized lanes, roundabouts, and median strips. In addition, due to variability in traffic signal operation at different intersections or at different points in time, crossing with the surge of near-lane parallel traffic may actually not always be recommended. A brief discussion of some of these issues follows.

### Channelized Right-Turn Lanes

At signalized intersections where there is typically a large volume of vehicles making right-hand turns from one street onto the other, there may be a separate right-turn lane. The radius of this turn lane can range from small, where vehicles must travel slowly and cautiously, to very wide, where vehicles tend to turn without slowing down much at all. Such “channelized” lanes may include a designated deceleration segment (for traffic approaching the intersection) and an acceleration segment (to facilitate a smooth, efficient merging into traffic on the perpendicular street). Such lanes are usually separated from the other traffic lanes by what is called a “right-turn island.” This triangular-shaped island may be raised or sometimes just painted onto the street. The island, if raised, may have cutout channels at street level for wheelchair accessibility.

The movement of vehicles in the channelized right-turn lane is not controlled by the traffic signal at the intersection. Traffic in channelized-right-turning lanes is typically

uncontrolled, but they may be controlled by a yield sign, a stop sign, or a separate traffic signal. Unless there is a separate acceleration lane, the channelized right-turning vehicles must yield to traffic on the perpendicular street.

Locating the crosswalk for crossing the right-turn lane, locating the right-turn island, and determining the correct time to cross can be very challenging at some intersections. As the crossing is diagonally positioned relative to the intersection, it is not possible to align with traffic flow on the parallel or perpendicular street; further, depending upon the size and shape of the channelized lane and the island, there is no reliable indicator for alignment that can be used at all intersections. For these reasons, a decision on whether and how to cross a channelized lane must be made on a case-by-case basis.

In order to cross a channelized lane, the traveler must first confirm that there are either no vehicles in the lane or that the traffic has yielded to the traveler. This, however, can be difficult to do. While traffic is supposed to yield to pedestrians, general experience has shown that vehicles do not stop reliably, especially if the traveler is attempting to cross at a location close to the merge point where vehicles enter the perpendicular street. Drivers either stop at the merge point or, moving through the right-turn lane, are typically looking for a gap in traffic before merging onto the perpendicular street. Because the driver's attention is on vehicular traffic, they may not reliably notice a pedestrian who is preparing to cross the channelized right-turn lane.

## **Roundabouts**

Roundabouts are circular intersections with specific features, including channelized approaches at which traffic enters or exits the circle. Traffic entering the circle yields to traffic already moving within the circle. Roundabouts are a member of a larger group of circular intersections that include "rotaries" and "traffic circles" that are found in many cities.

As they allow traffic to move efficiently, roundabouts are being constructed or are replacing signalized intersections in some areas. Pedestrians should not cross the circulatory roadway of the roundabout itself, but only cross the approach streets which generally have channelized approaches. Crosswalks on these approaches are not typically located immediately next to the circular roadway, but are often located about 1–3 car lengths away from the vehicular yield line.

The intersecting streets have "splitter islands" in the middle of the street to separate entering and exiting traffic. These islands may be simply painted on the road or may be raised. In the latter case, the island generally has cut-outs through which the crosswalk passes. These islands provide a pedestrian refuge in the middle of the street, when necessary.

Alignment for crossing an approach street cannot depend on traffic sounds as at other crossings. Unlike traffic sounds at typical four-leg-right-angle intersections, sounds at roundabouts are difficult to use for both initial alignment and for maintaining alignment while crossing, because vehicles on the circulatory roadway travel in curvilinear paths. Similarly, vehicles entering and exiting the circulatory roadway do not stop (unless yielding), and their auditory output may also project a curved path. Additionally, if there is a significant amount of traffic on the circulatory roadway, masking sounds can compromise the traveler's ability to hear approaching traffic sufficiently (Wadhwa, 2003—cited in Sauerburger, 2006).

Alignment for crossing an approach lane is generally done by aligning oneself perpendicularly to the bottom of the curb ramp at the crosswalk. Although early studies suggest that blind pedestrians are unlikely to veer enough to enter the circulatory roadway (Long et al., 2005), such crossings should be made with extreme care.

In addition to difficulties with alignment that travelers encounter at roundabout intersections, the design of such intersections can also make it difficult to identify the safest time to initiate a crossing (Long et al., 2005). This usually means:

(1) crossing when no approaching vehicle can reach the crosswalk before the crossing is completed, (2) crossing with the expectation that approaching vehicles that can reach the crosswalk before the crossing is completed will be able to yield and then monitoring these vehicles to ensure that they yield, or crossing when vehicles are stopped or stopping just upstream of the crosswalk.

(Long et al., 2005, p. 615)

Still, it is obvious that depending upon size, various physical features (e.g., terrain, number of intersecting streets, presence of a splitter island, number of lanes to be crossed), and traffic flow, crossing at roundabouts can range from difficult to unsafe.

Lastly, as vehicles become increasingly quiet, concern arises regarding travelers' ability to hear approaching traffic reliably, identify crossable gaps in traffic, and detect vehicles that have yielded upstream, especially when needed auditory information can potentially be masked by the sounds of vehicles moving on the circulatory roadway.

## Timing Exceptions

### Crossing with the far-lane parallel surge

At traffic signals where there is no access to the pedestrian signal, the best way to ascertain that the pedestrian WALK signal might be active is to cross with the traffic surge in the near parallel lane(s) (see exceptions below). If there is no traffic in the near parallel lanes, the traveler can cross with the far-lane parallel traffic surge if she can confirm that she has the right of way, and the phase does not give the right-of-way to any vehicles that will cross her path.

There are instances when it might be easier to hear the traffic surge in the far parallel lane/s.

- The parallel street does not have a near-lane parallel surge.
- The near-lane parallel traffic (oncoming or same direction) has only one driving lane that is being held up by a vehicle that is turning onto the perpendicular street.
- When crossing a wide street with an oncoming near-lane parallel surge, the far-lane parallel (same-direction) surge may be easier to hear (e.g., it might be closer).

**Note:** Without a near-lane parallel surge, vehicles from the far parallel lane that are turning onto the perpendicular street will not be blocked by vehicles traveling straight through in the near parallel lane. The traveler should use extra caution when crossing.

### Exclusive pedestrian phase

At intersections with an exclusive pedestrian phase (aka "Scramble Phase"), all vehicles have a red light and must stop while pedestrians cross the street (although right turns on red may still be permitted). In such situations, there are separate traffic signal phases for each of the following: parallel traffic, perpendicular traffic, and pedestrian traffic.

Although pedestrians can cross in any direction (even diagonally) during the exclusive pedestrian phase of the cycle, the blind traveler may be able maintain her orientation more easily by making two perpendicular crossings instead of a diagonal crossing. As a note, without parallel moving traffic, some travelers find it more difficult to maintain a straight line of travel across the street.

The exclusive pedestrian phase may be automatic or activated by a pedestrian button. An APS would give the traveler access to the pedestrian signal so that she would know when the WALK interval begins. The traveler should cross only after confirming that no traffic is in motion on either street.

## **Leading pedestrian interval**

At intersections with a leading pedestrian interval, traffic on the perpendicular street will have a red light, and the walk interval for crossing will begin for a specified period of time (usually 3–7 seconds) before the near-lane parallel traffic receives a green light. In this situation, pedestrians begin crossing with the visual WALK indication after confirming that no vehicles are moving across their path.

Unless an APS is present, the traveler without functional travel vision may not know when the leading pedestrian interval begins. If she begins her crossing with the delayed near-lane parallel surge, she may not have sufficient time remaining to complete the crossing before the perpendicular traffic gets the green light.

## **Start of WALK interval**

In some instances, the WALK interval does not begin with the next near-lane parallel surge after the traveler pushes the pedestrian button; instead, the interval begins as soon as the traveler presses the pedestrian button. This can happen when there are no vehicles or pedestrians waiting to cross a major street when the traveler pressed the button to cross the minor street, and the controller does not make the pedestrian wait.

Some traffic signals include a protected right turn, which can make pedestrians wait and give right-turning vehicles the right of way during the near-lane parallel traffic surge.

When emergency vehicles preempt the signal, the WALK signal will not come on with the near-lane parallel traffic surge.

With Leading Pedestrian Intervals, the WALK signal begins a few seconds before the near-lane parallel traffic surge.

When the traffic controller is coordinating the timing for two or more signalized intersections, the WALK interval may not be activated until the second near-lane parallel surge. This can occur when the traffic controller is coordinating the timing for two or more signalized intersections. In order to keep the arterial street moving most efficiently, for example, the central controller may first change the light for the secondary street to green only long enough to allow one car or just a few cars to go—but not enough time to allow a pedestrian to cross the arterial street (the DON'T WALK indicator will be displayed). The WALK interval and WALK display would then be activated in the next signal cycle with the near-lane parallel traffic. Whether or not the WALK interval occurs with the first or second near-lane parallel phase can change at any time or day of the week as traffic volume changes.

This is a situation where an accessible pedestrian signal would be vital for pedestrians who do not have sufficient vision to see the WALK indicator.

## Traffic officers

In situations where traffic signals are malfunctioning, traffic officers may direct traffic in place of standard signals. Similarly, if road conditions are temporarily altered (e.g., an accident blocks the road ahead), traffic officers may direct the movement of vehicles and pedestrians around the problem.

Generally, the traffic officer controls the traffic in a pattern similar to a traffic signal (i.e., vehicles at a traffic officer-controlled intersection usually act in groups rather than individually). The traffic officer may control an intersection with a whistle and verbal commands in addition to gestural signals. Generally, the traffic officer's authority and control over an intersection supersedes all other controls.

At intersections near schools, a school crossing guard may direct traffic to assist children crossing the street. Generally, crossing guards are present only during hours in which children are arriving at school and leaving at the end of the school day.

At an intersection controlled by a traffic officer or school crossing guard, the traveler should cross as directed by these individuals and monitor traffic before and during the crossing. If no specific directions are given, the traveler should determine the appropriate time to cross by monitoring traffic patterns and use extra caution.

## Intersection Analysis

As intersections become more complex, it is often recommended that before crossing (especially at an unfamiliar intersection), the traveler listen to several light cycles to determine the order in which traffic from different directions begins to move, the presence of separate turn phases, and the length of each phase of the cycle. The traveler also identifies any variability in the phases or traffic patterns. She should always keep in mind that the signal cycle can vary from one cycle to the next.

In analyzing the intersection, the traveler considers the following features:

- Traffic controls and possible sequences and lengths of phases in the cycle
- Shape of intersection (e.g., four-leg-right-angle, T, Y, skewed, offset)
- Direction of traffic flow (e.g., one-way or two-way traffic on each street)
- Volume, speed, and distance of traffic sounds, which can give the traveler a sense of how many driving lanes there might be on the perpendicular street as well as the possible presence or absence of parking lanes
- At crossings with traffic signals, whether there is a high volume of near-lane right-turning vehicles turning onto the perpendicular street
  - When crossing in a counterclockwise direction (parallel street on the left), some intersections at certain times may have a high volume of right-turning traffic. This can potentially cause the traveler to experience an excessive delay in being able to step off the curb (resulting in insufficient time remaining to complete the crossing safely) or a close call with moving right-turning cars. In such a situation, the traveler can choose to wait for the next



- pedestrian phase, perform clockwise crossings to arrive at her destination corner, modify her route and cross at a different intersection, or solicit public assistance.
- At crossings with no traffic control, whether the traveler can hear approaching vehicles sufficiently in advance to cross safely without risk of a pedestrian-vehicle conflict or collision

**Note:** Traffic engineers may designate some crossings as unsafe for any pedestrian to cross. These locations are marked by signs or barriers (see Figures 6.04a and 6.04b). Such signs or barriers, however, may not be physically detected by the traveler who is blind. In most cases, the intersection analysis will allow the traveler to determine that it's an unsafe place to cross.



**Figure 6.04a**

One way to designate that start corners where crossing is not permitted is by signs. Travelers who do not possess travel vision, however, may miss these warnings.



**Figure 6.04b**

Another way to designate start corners where crossing is not permitted is by barriers. Travelers who do not possess travel vision, however, may miss these warnings.

As intersection design and traffic controls become more complicated, it is recommended that the traveler analyze traffic patterns and phase sequences before making any crossing, even at familiar intersections. Doing so will help the traveler detect any changes or unusual circumstances at the intersection that can affect safety or street-crossing timing. Unusual circumstances might include such things as construction or an accident at the intersection. Another example is the presence of a large vehicle parked close to the corner. Such a vehicle can form a sound shadow, which minimizes the traveler's ability to hear approaching traffic, and/or block drivers' views of the traveler. Other noteworthy conditions include traffic signals that are not working or are flashing red or yellow, a change in phase sequences, and weather conditions.

## **Related Techniques**

Areas Without Sidewalks  
Negotiating a Median Strip  
Signaling Drivers



# **SPECIAL SITUATIONS**

# VEHICLE IN THE CROSSWALK

## Purpose

This technique is used to walk safely around a vehicle that has pulled across the crosswalk or travel path. This may include vehicles that have pulled forward into the crosswalk or, when gridlock is present, vehicles that have not fully cleared the intersection and crosswalk. This technique can also be used to walk around a vehicle in the perpendicular traffic lane that the traveler encounters after inadvertently veering away from the parallel street.

## Prerequisite Techniques

Alignment  
Basic Crossing  
Vehicle in the Travel Path

## Teaching Environments

Opportunities to learn and practice this technique often present themselves naturally during the course of instruction.

If it is deemed helpful to teach this technique to a given traveler in a protected environment prior to performing this technique during an actual street crossing, it is possible to stage this situation with the help of one or two accomplices. It can be staged in an alleyway or at a quiet intersection where traffic on the parallel and perpendicular streets can be carefully monitored and controlled, as necessary. As the traveler negotiates the vehicle in the "crosswalk," a second accomplice can even drive by, providing controlled parallel traffic.

## Skill

1. If, while crossing the street, the traveler encounters a vehicle stopped across the travel path, the traveler walks around it using the VEHICLES IN THE TRAVEL PATH technique.
  - If the vehicle partially blocks the crosswalk, the traveler trails around the end of the vehicle on the side that is closest to the parallel street. She then projects and follows a line of travel to the destination corner (see Figure 7.01).
  - If the vehicle totally blocks the crosswalk, the traveler can trail to the end of the vehicle on the side closest to the parallel street and either (a) project and follow a straight line of travel from the far end of the vehicle's bumper to the destination corner, or (b) continue around the vehicle to a point on the vehicle's other side that is opposite where she initially contacted the vehicle, and then project and follow a straight line of travel to the destination corner (see Figure 7.02).



**Figure 7.01**

If the vehicle partially blocks the crosswalk, the traveler trails around the end of the vehicle on the side that is closest to the parallel street. She then projects and follows a line of travel from the vehicle's corner to the destination corner. The traveler's path is indicated by solid and dashed white lines.



**Figure 7.02**

If the vehicle totally blocks the crosswalk, the traveler can trail around the vehicle on the side closest to the parallel street to a point on the vehicle's other side that is opposite where she initially contacted the vehicle, and then project and follow a straight line of travel to the destination corner. The traveler's path is indicated by solid and dashed white lines.

## Common Errors and Corrections

### Error:

The traveler walks around a vehicle encountered in the crosswalk by passing on the side of the vehicle away from the parallel street.

### Correction:

The traveler should always pass a vehicle encountered in the crosswalk toward the parallel street side. This makes her most readily seen by drivers and prevents her from inadvertently stepping into the path of a vehicle moving in the next lane.

## Notes for Teachers

If the traveler hears a vehicle pull across the crosswalk before she steps off the curb or if encounters a vehicle that has not fully cleared the intersection and crosswalk, she can wait until the vehicle has moved out of the way before she begins to cross. This is especially important if the traveler suspects that the vehicle is positioned so far into the crosswalk that passing it would put her dangerously close to parallel traffic.

If the traveler contacts a vehicle within the first step or so off the curb, she can choose to either return to the curb and wait for the next traffic cycle or she can continue the crossing if she deems it safe.

During the early stages of training, it may be helpful to warn the traveler before she begins her crossing that a vehicle is partially or completely blocking the crosswalk. This can help to eliminate anxiety that might otherwise be caused by unexpectedly encountering an obstacle during a crossing.

This technique can also be used to walk around a vehicle in the perpendicular traffic lane that the traveler encounters after inadvertently veering away from the parallel street.

## Related Techniques

Signalized Intersections<sup>1</sup>

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<sup>1</sup> Knowing the VEHICLE IN THE CROSSWALK technique enables the traveler to safely and efficiently navigate around a vehicle that partially or fully blocks the crosswalk and to regain her line of travel when crossing the street at a signalized intersection.

# NEGOTIATING A MEDIAN STRIP

## Purpose

To safely and efficiently cross a median strip that a traveler encounters while crossing a street

## Prerequisite Techniques

Recovery from a Veer  
Signalized Intersections  
Unsignalized Intersections

## Teaching Environments

Median strips may be of any width. There may be room on the median strip that allows the traveler to step up onto it, or there may be structures or landscaping that prevent her from doing so. In many cities, median strips are utilized as bus or streetcar stops. Usually located in the middle of the street, some median strips end at the inside border of the pedestrian crosswalk (see Figure 8.01). Other median strips actually extend into the crosswalk, with or without a channelized pedestrian path cut through them (see Figure 8.02).



**Figure 8.01**

This median strip does not extend into the crosswalk.



**Figure 8.02**

This median strip extends into the crosswalk and has a channelized pedestrian path cut through it. Ideally, the channel should have a detectable warning surface.

Give the traveler experience crossing streets that have differing median strip configurations:

- Those that do not cross the crosswalk,
- Those that extend into the crosswalk and have a channelized pedestrian path cut through them.

Introduce this technique at streets that have clear surges of near parallel traffic and a minimum amount of traffic on the perpendicular street. Having less traffic on the perpendicular street can minimize the anxiety that many new travelers experience when they stand on a median strip and hear traffic moving on both sides of the median strip at the same time.

- Initial crossings should be done at intersections that have stop sign controls and minimal traffic on the perpendicular street and where the median strip does not have bushes, poles, or other obstacles to negotiate.
- Progress to crossing median strips at signalized intersections.
- Lead up to crossing at intersections where the median strip does have bushes, poles, or other obstacles to negotiate.

Opportunities to practice this technique often present themselves naturally during the course of instruction, especially when traveling in business areas and when crossing at signalized intersections.

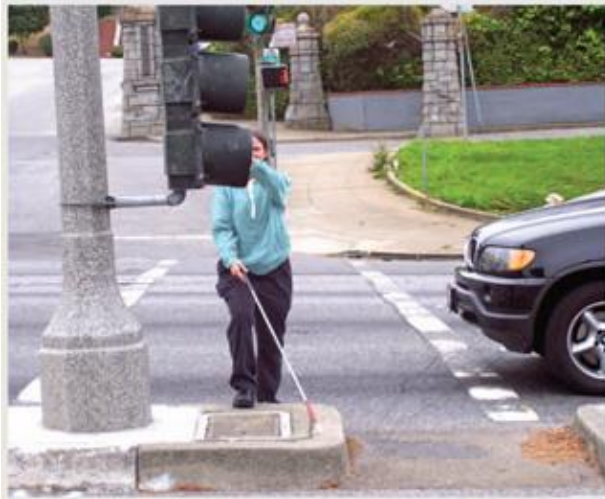
## Skills

### If Median Strip Protrudes Into Crosswalk

Use this technique to safely and efficiently negotiate a contacted median strip that protrudes into the crosswalk. If the traveler is not certain that the median strip protrudes into the crosswalk, she should follow the procedures described in the next section, "If Median Strip Does Not Protrude Into Crosswalk."

The traveler can attempt to cross the entire street in one cycle with the following procedure.

1. The traveler steps onto the median strip, remembering to first clear with her cane.
  - In some areas there are poles with signs or traffic signals at face height on median strips (see Figure 8.03). Using the UPPER HAND & FOREARM (Modified) technique can help to protect her face as she steps onto and traverses a median strip. This is especially important in an unfamiliar area.



**Figure 8.03**

The traveler uses the UPPER HAND & FOREARM (Modified) technique to protect her face from unwanted contact with protruding hazards (e.g., signs, low traffic signals) located on the median strip.

2. She can then cross to the far side of the median strip, locate the edge (e.g., down-curb) with her cane, and then step down to continue the crossing.

**Notes:**

- The traveler can sometimes determine whether or not a median strip protrudes into the crosswalk by the angle at which she contacts it. If the traveler contacts a median strip that appears to be perpendicular to her path, then either the median strip extends across the crosswalk or the traveler may not have veered enough to need to correct her direction of travel. If she contacts a median strip at a sufficiently large angle to suggest a possible veer away from the parallel street, then she has, indeed, most likely veered. If the traveler is uncertain whether or not she contacted a median strip that extends into the crosswalk or whether she has possibly veered and contacted the median strip outside of the crosswalk, she should follow the procedures in "If Median Strip Does Not Protrude Into Crosswalk."
- When the length of the vehicle or pedestrian phase is too short to allow the traveler to traverse the median strip and complete the crossing in one cycle, the



traveler will generally find it safer to wait on the median strip for the next cycle before finishing her crossing. The decision to wait or complete the crossing will generally depend upon the width of the street, the length of the signal phase, and the traveler's familiarity with the intersection. If in doubt, it is best to remain on the median strip and exit the median strip at the next safe timing.

## **If Median Strip Does Not Protrude Into Crosswalk**

To safely and efficiently negotiate a contacted median strip if it does not protrude into the crosswalk

The traveler should try to cross the entire street during one pedestrian phase without contacting the strip. If the traveler does contact the median strip, she should do the following:

1. Step onto the median strip, remembering to first clear with her cane. She should also use the UPPER HAND & FOREARM technique if she is unfamiliar with the median strip or if there are objects on it that she might otherwise contact with her head or upper body.
2. She can then turn toward the parallel street and walk down the middle of the median strip to its end closest to the parallel street (stopping just before the curb becomes rounded). If the strip is very narrow, she may need to follow the edge of the median strip using the TOUCH & DRAG technique. In this case, because she is close to moving traffic, it may be safer for the traveler to stop moving when perpendicular traffic is in motion and to walk toward the end of the median strip when traffic is moving only on the parallel street.
3. Upon reaching the end of the median strip, the traveler turns to face the destination corner and anchors her cane on the median down curb, positioning herself to cross the remainder of the street at the next cycle. It is safer for the traveler to stand one step back from the edge of the median strip while waiting, due to the proximity of moving perpendicular traffic, and then for her to move forward to the down curb when a safe timing to exit the median has been detected.

## **General Modifications**

If it is impossible to step up onto a median strip, due to the presence of bushes or other objects on it, the traveler should follow the edge of the median strip toward the parallel street, using the THREE-POINT technique, until she finds an opening onto which she can step. If she reaches the end of the median strip without finding an opening, the traveler then turns and makes a quick decision to wait in the crosswalk adjacent to the median or complete her street crossing. It is important that she do this as quickly as possible, not spending any unnecessary time in the street. If in doubt, it is best to remain adjacent to the median and complete the crossing at the next safe timing.



## Common Errors and Corrections

### Error:

After stepping up onto a median strip following a veer, the traveler walks across the strip to the far side and prepares to cross.

### Correction:

The traveler should walk toward the parallel street and locate the end of the median strip to wait for the next safe-street-crossing timing. This positions her to complete the crossing most safely.

### Error:

At a signalized intersection that routinely gives a relatively short pedestrian phase for crossing the street but that gives a pedestrian phase each cycle: After stepping up onto a median strip, moving toward the parallel street, and locating the end of the median strip, the traveler fails to wait for a new safe-street-crossing timing before completing the crossing.

### Correction:

If the traveler is familiar with the crossing and judges that she still has time to complete the crossing, she may do so. If there is any doubt, however, the traveler should wait for a new green signal or WALK interval (if a pedestrian signal is present) to ensure that she will have sufficient time to complete the crossing before the signal turns red. Depending upon the length of the signal phase and the amount of time spent negotiating the median strip, it may be impossible to complete the crossing safely in the first cycle.

## Notes for Teachers

Sometimes a new traveler finds it difficult to distinguish between contacting a median strip and contacting the curb on the opposite side of the street. Emphasizing ongoing time-distance awareness and attention to traffic will help the traveler to distinguish between the two.

At intersections where the traffic signal is actuated and the parallel street has a regular stream of moderate to heavy vehicular traffic, the traveler will generally be able to wait on the median strip (whether or not it has a pedestrian pushbutton) for the next WALK interval. When the parallel street has moderate to heavy traffic volume, the length of the phase for near parallel traffic is usually long enough to complete a crossing from the median strip to the destination corner.

**Note:** Some signalized intersections have a very short green signal/pedestrian phase (if a pedestrian signal is present) that allows sufficient time to cross only to the median, requiring a second signal cycle to reach the destination corner.

- If the green signal/pedestrian phase is not long enough to complete the crossing, the traveler and O&M specialist can contact the local traffic engineer to request that the crossing time be increased.

## **Related Techniques**

None

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Catalog Number 8-75982-00